MODEL 9820A AND 9821
COMMUNICATIONS PANELS
OPERATION MANUAL

WILTRON

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SECTION I

GENERAL

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1. INTRODUCTION

The WILTRON 9820A and 9821 Communications Panels (Figures 1-1 and 1-2) interface with telephone lines and interbay trunks through a 9825 or 9826 Telephone Line Selector in a 9800 Test Board. A 9827 Telephone Line Expander can also be used with the 9825 or 9826 in some applications. The 9820A and 9821 also interface with test circuits through a 9830 or 9830M Test Selector in the test board.

The speaker, headset, and power supply circuits of the 9820A and 9821 are similar in nature to those of the 9820 Communications Panel. Refer to Section III of the 9800 Operation and Maintenance Manual (2-9800-OMM) for a description of the 9820.

The dialer circuits of the 9820A and 9821 are equipped with several operating features that are not available with the 9820. For this reason, the information in this manual is applicable only to the dialer circuits of the 9820A and 9821. References are made to 2-9800-OMM for the speaker, headset, and power supply functions of the 9820A and 9821 units, as appropriate.

The dialer circuits of the 9820A are equipped with the following features:

(a) Manual dialing
(b) Automatic dialing by operation of a single pushbutton
(c) Fast dialing
(d) Stop-dial operation
(e) Wink-start and delay dialing operation
(f) Stop-dial disable
(g) Dial pause
(h) Two-stage dialing

The 9821 dialer performs the same functions as that of the 9820A. It also has a 12-digit display window on which various messages are observed during dialing. The 9821 stores up to 16 telephone-line and/or trunk numbers in memory for future testing. The additional operating features of the 9821 dialer are discussed in more detail later.

1.01 9820A COMMUNICATIONS PANEL DESCRIPTION

A. Manual Dialing

Manual dialing is done from the 9820A keypad, and is similar to manual dialing on the 9820. Continuous dial pulses and single DTMF and MF tones can also be transmitted by the 9820A in this dialing mode. Circuit numbers of any length can be manually dialed from the 9820A.

B. Automatic Dialing

(1) Send Register. When a number is manual-

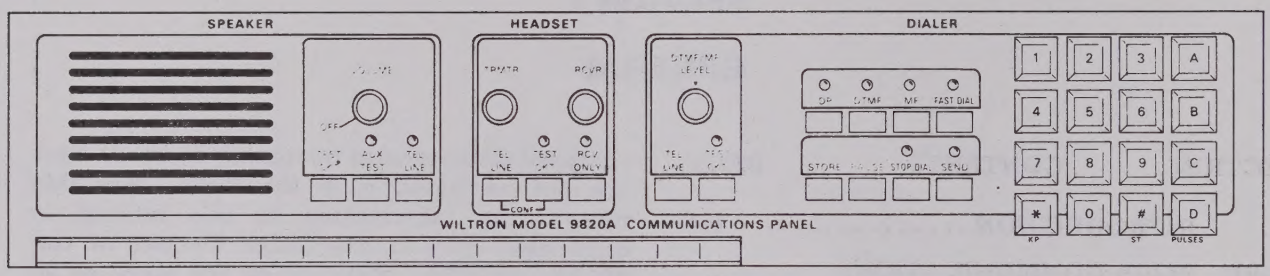

Figure 1-1. Model 9820A Communications Panel

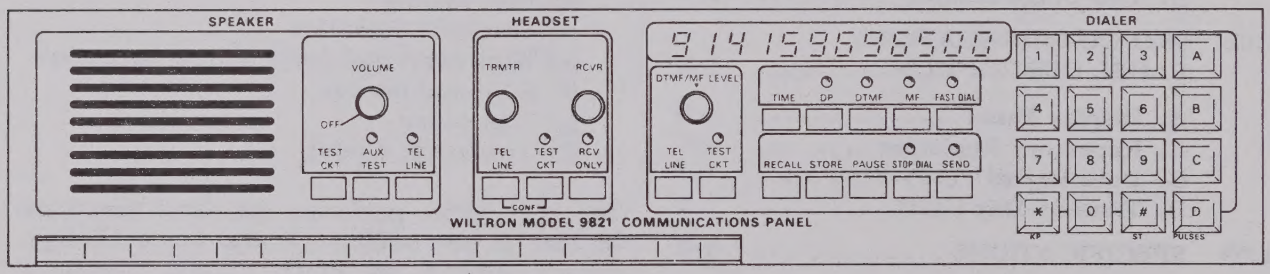

Figure 1-2. Model 9821 Communications Panel

ly dialed on the 9820A keypad, its digits are also fed into a send register. Once the number is in the send register, the **SEND** button on the 9820A can be pressed to redial the number. The associated **SEND** lamp flashes while the digits are sent out. Also, the number is fed into a store-and-forward register when the **SEND** button is pressed, so that the number can be redialed again as often as necessary. Redialing occurs in the mode (pulses, DTMF, or MF) and at the rate (normal or fast dialing) selected by the test board operator.

(2) Storing Numbers. A number can also be stored in the 9820A store-and-forward register prior to out-dialing. First, the **STORE** button is pressed to disable out-dialing and to tell the register that a number will be entered for storage. The desired dialing mode and rate are then selected, using the associated dialer buttons. Finally, the circuit number is dialed

on the keypad. If an error is made during number entry, the store-and-forward register is cleared by pressing the **STORE** button and then redialing the entire number into storage.

The **SEND** button is pressed to simultaneously end the storage mode and dial up the circuit as described above. After the number is dialed, the **SEND** lamp goes out. However, the number remains in storage until a new number is dialed on the keypad. At that time, the old number is lost and cannot be recalled by the test board operator.

C. Fast Dialing

The 9820A dialer operates at either normal or fast dialing. In normal dialing, pulsing occurs at 10 pps, DTMF tones are sent out at 5 characters per second, and MF tones are transmitted at 7 characters per second. In fast dialing, pulsing occurs at 20 pps, and all DTMF and MF tones are transmitted at 10 characters per second.

The dialing rate is selected prior to dialing digits out of the send register by pressing the **FAST DIAL** button. For normal dialing, the associated **FAST DIAL** lamp is off; for fast dialing, this lamp is lit until the **FAST DIAL** button is pressed again to restore normal dialing.

D. Stop-Dial Operation

In stop-dial operation, outpulsing from the 9820A dialer is controlled by trunk-circuit supervision, received from a far-end office. When a trunk with stop-go dialing (DP mode) is accessed from the 9800 Test Board, the far-end circuit may not be able to receive all of the dialed digits immediately. Outpulsing from the 9820A at the near end is therefore interrupted by an external stop-dial command (off-hook supervision). When the far end tells the near end that it is ready to receive more dial pulses, it goes back on-hook, and outpulsing resumes.

The stop-dial feature is not functional when dialing up telephone lines on the 9820A (i.e., when **DIALER TEL LINE** button is operated).

Stop-dial can be used for trunk testing only when all of the following conditions exist:

- The 9820A dialer is connected to a test circuit via the 9830 Test Selector (**DIALER TEST CKT** button operated).
- The **DP** dialing mode is selected (only dial-pulse trunks are affected).
- The stop-dial function is enabled via the **STOP DIAL** button on the 9820A.
- One of the following off-hook supervision types is used: E&M, SF, loop (closure or opening), battery/ground, reverse-battery loop signaling, or four-wire SX.

(1) Stop-Dial Timing: Figure 1-3 shows the stop-dial timing sequence. The far-end circuit goes off-hook when it is not ready to receive dial pulses. It sends the off-hook status back to the near end, where the 9830 Test Selector senses it and applies a stop-dial command to the 9820A. During an interdigital pause, the 9820A scans this input for the presence of the off-hook. If this condition lasts for a minimum of 100 milliseconds, outpulsing is interrupted, and the **SEND** lamp is lit on the 9820A.

During an interruption, the next digit is held up until the far-end circuit is ready to receive more pulses. At that time, an on-hook signal is sent to the 9830 and outpulsing resumes automatically. The interruptions continue until all digits are outpulsed.

(2) Stop-Dial Enabling Sequence. On the 9820A, stop-dial operation is enabled by first pressing the **DIALER TEST CKT** button to select a test circuit (via the 9830). The **STOP DIAL** and **DP** buttons are then pressed. When the associated **STOP DIAL** lamp is lit, the stop-dial function is enabled, and the 9820A dialer is ready to detect off-hook conditions when they occur at the far end. Outpulsing commences when the far-end circuit initially goes on-hook, and subsequent interruptions occur as described above.

(3) False Supervision Detection. If a stop-dial interruption occurs but a subsequent

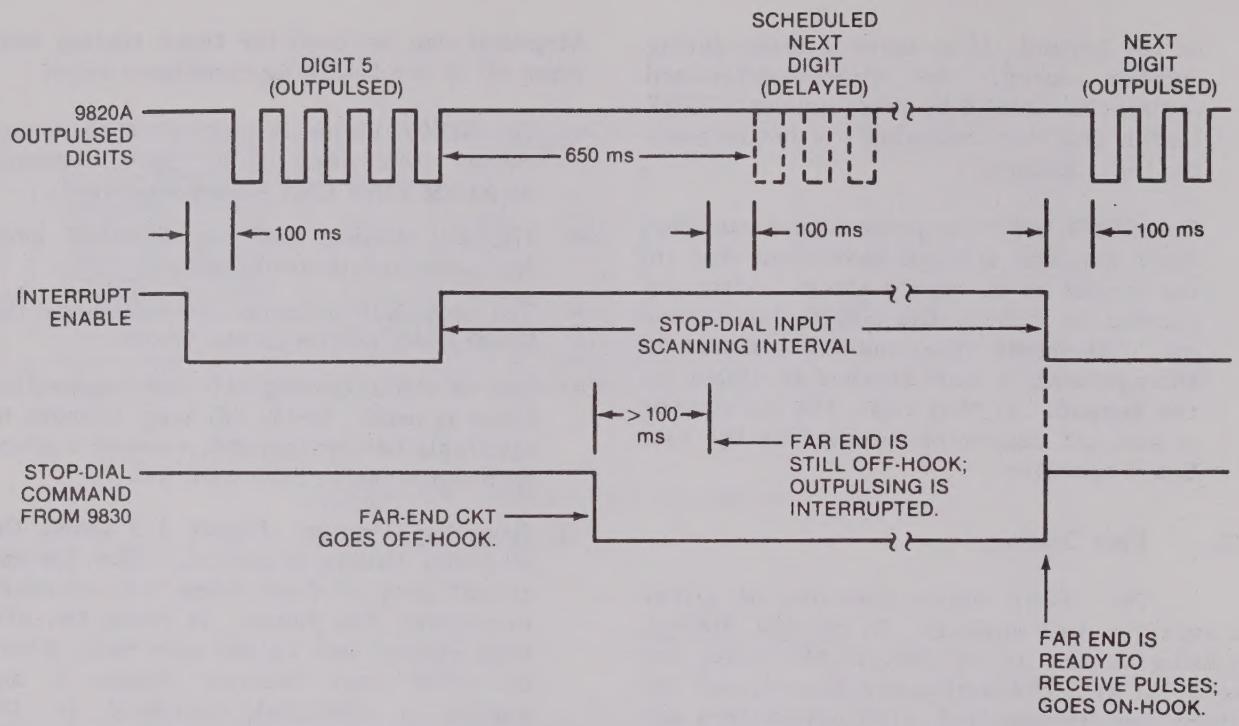

Figure 1-3. Stop-Dial Operation and Dialer Timing

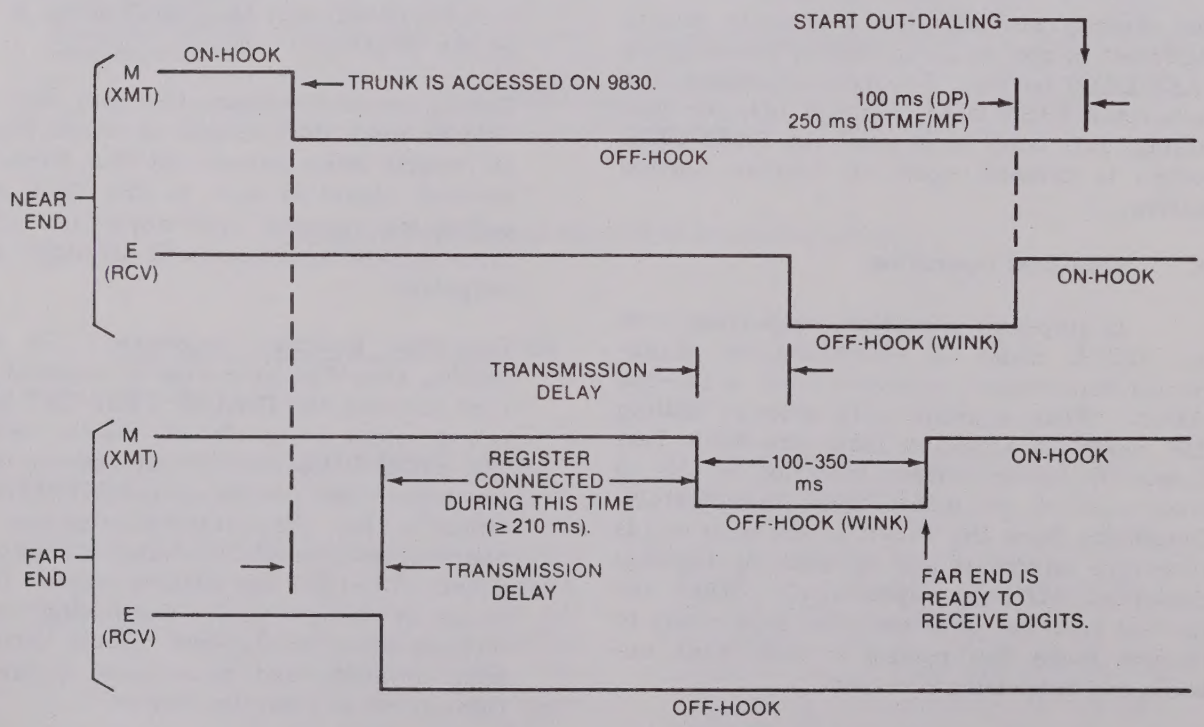

Figure 1-4. Wink-Start Dialing

on-hook signal is not received by the 9830, the remaining digits are out-dialed from the 9820A by pressing the **SEND** button. The **STOP DIAL** lamp flashes, indicating that the remaining pulses were sent out despite the off-hook condition (false supervision) at the far end. This method of forced outpulsing prevents 9820A dialer hangup, and the dialer is now available for testing other circuits.

E. Wink-Start and Delay Dialing

(1) Wink-Start Timing. In wink-start operation, trunk out-dialing does not begin until the far-end circuit is ready to accept digits. Figure 1-4 shows the timing relationship between the near-end and far-end trunk circuits (E&M signaling used as an example). When a trunk is accessed from the near-end test board, an off-hook is applied to the M lead and received a short time later by the far-end E lead. A register or sender is connected to the far-end circuit, and after that connection is made, the far end returns a momentary off-hook signal (wink pulse) to the near-end 9830. This wink pulse is typically up to 350 milliseconds long; it notifies the 9820A to begin out-dialing a short time after it is received on the circuit E lead.

Wink-start dialing is functional only when the 9820A dialer is connected to a test circuit and the stop-dial function is enabled via the **STOP DIAL** button. This function can be used in all three dialing modes, and recognizes the same off-hook supervision states as described for stop-dial operation.

(2) Wink-Start Operation. After a wink pulse is received (far-end circuit on-hook), out-dialing commences automatically, and the **SEND** lamp flashes as each digit is sent out. If the far-end circuit does not return to on-hook (Figure 1-4), the digits are forced out by pressing the **SEND** button. The **STOP DIAL** lamp flashes to indicate the false supervision state previously described.

(3) Delay Dialing. Delay dialing is similar to wink-start dialing. In delay dialing, however, the wink pulse is initiated at the far end before a sender or register is connected to the circuit there. Also, this pulse is much longer (up to 30 seconds, depending on the type of office switching equipment used). The wink pulse ends when the connection is made.

F. Stop-Dial Disable

The test board operator can disable the stop-dial and wink-start (or delay-dialing) functions when they are not needed for trunk testing. This is done by pressing the **STOP DIAL** button on the 9820A and verifying that the associated lamp goes out. When the lamp is off, the dialer cannot detect an incoming stop-dial signal (Figure 1-3) or wink pulse (Figure 1-4) from the 9830. As a result, out-dialing commences only when the **SEND** button is pressed. Also, if stop-dial is disabled, outpulsing is not interrupted unless a pause or break point is reached. At that time, the **SEND** button must be pressed again to send the remaining digits.

The stop-dial or wink-start function can be restored by pressing the **STOP DIAL** button again. If the 9820A dialer is connected to a test circuit (via **TEST CKT** switch and lamp), the associated lamp lights, indicating that the dialer can operate as previously described. When the dialer is connected to a telephone line, the stop-dial and wink-start functions are permanently disabled, and the **STOP DIAL** lamp stays off.

G. Dial Pauses

The test board operator can also insert pauses into a digit string while storing it in the 9820A. This is done by pressing the **PAUSE** button once for each pause desired. A dial pause is used to dial up trunks via MF tones and then send calling-party digits for ANI/CAMA operation (also MF). During storage of the number in the store-and-forward register, the pause is inserted between the trunk number and the calling-party digits. Dial-pause operation can similarly be used in wink-start applications. When an interruption (pause) is reached, a subsequent wink pulse (Figure 1-4) sends out the remaining digits. Also, 0+, 1+, and 9+ trunks can be dialed using the pause feature.

Although pauses are not actually out-dialed or stored, their locations are remembered by the dialer when the **SEND** button is pressed. Pauses cannot be inserted in a digit string when manually dialing a number on the keypad.

When a pause is reached during out-dialing, the **SEND** lamp is lit on the 9820A to indicate the interruption. At this time, the operator can change the dialing mode and/or rate, if necessary, for the next group of digits. If the stop-dial function is not activated, the **SEND** button is pressed to resume out-dialing after each pause. This is repeated until all digits are transmitted and the **SEND** lamp goes out.

H. Two-Stage Dialing

The 9820A permits a test board operator to change the dialing mode and/or rate during an out-dial sequence. When a number is being stored, the operator can make this change at the desired location in the digit sequence; this point is called the break point. Each break point can be a mode change, a rate change, or a combination of both.

(1) Application. Two-stage dialing is used when accessing trunks and sending the calling-party digits used by ANI/CAMA equipment in central offices. The trunk number is typically dialpulsed, with the calling-party information sent as MF tones. In this application, the break point is between the last digit of the called number and the first digit (KP character) of the calling number.

(2) 9820A Operation. In two-stage dialing, the mode and rate are selected for the first digit substring, and the digits are dialed on the keypad. The mode is then changed for the remaining digits by pressing the **DP**, **DTMF**, or **MF** button. Once the mode and/or rate are changed, the remaining digits are dialed into the send register.

When a number is stored and the **SEND** button is pressed, the first digit substring is transmitted in the mode and at the rate originally chosen. The break point is then reached, and out-dialing is interrupted. The mode and/or rate are automatically changed by the 9820A, and the **SEND** button is pressed again to transmit the remaining digits. In stop-dial or wink-start operation, out-dialing resumes automatically when the far-end circuit goes back on-hook (wink pulse received). When out-dialing ends, the original mode and rate are restored so that the number can be redialed, if necessary.

1.02 9821 COMMUNICATIONS PANEL DESCRIPTION

The 9821 Communications Panel performs all of the dialer functions previously described, using a send register and a store-and-forward register similar to those in the 9820A. However, this panel is also equipped with the following operational features:

(a) 12-digit display panel
(b) Repertory (memory) registers
(c) Data recall
(d) Time-of-day clock

A. Display Panel

The display panel displays up to 12 digits of a telephone-line, trunk, or other circuit number at a time. It also displays various messages during dialer operation, and can be used to set and/or observe the time of day. Table 1-1 summarizes the display messages, which are also described below.

(1) Initial Power-Up. When power is initially applied to the 9821, two digits momentarily appear on the display panel. These digits represent the software version (design level) of the 9821. After about 2 seconds, this message clears.

(2) Manual Dialing. When a number is dialed on the 9821 keypad, the digits fill the display panel from right to left. If there are more than 12 digits, only the last 12 are displayed during dialing.

(3) Automatic Out-Dialing. When the **SEND** button is subsequently pressed (i.e., number is redialed), the display panel highlights each digit as it is out-dialed. The first 12 digits of the number are then

displayed. The same actions occur when the **SEND** button is pressed to out-dial a number stored in the store-and-forward register.

(4) Out-dialing Interruptions. When out-pulsing is interrupted by an off-hook signal in stop-dial operation, the next digit to be sent out flashes on the display panel. If the interruption is caused by a dial pause or two-stage break point programmed in by the test board operator, the display panel action is the same as described above for stop-dial operation. However, a solid dot precedes the flashing digit when a dial pause is reached, and a flashing dot indicates a break point.

(5) Storing Information. A number can also be stored in the store-and-forward register prior to out-dialing in a fashion similar to that for the 9820A (see paragraph 1.01B(2)). The 9821 displays "Stor And For" when the **STORE** button is pressed, and the digits are displayed as they are dialed on the keypad.

(6) Store-and-Forward Register Updating. The store-and-forward register's contents can be changed by doing one of the following:

(a) Dialing another number on the keypad and then pressing the **SEND** button. The display clears when the first button is pressed on the keypad, and then the new digits appear as they are dialed.

(b) Storing a new number, as described in paragrpah 1.01B(2) for the 9820A. The store-and-forward register updating sequence is completed when the **SEND** button is pressed. This gives the test board operator a chance to recall the old contents and to redial a previous circuit, if necessary.

B. Repertory Registers

The 9821 can also store frequently used line and/or trunk numbers in memory for future use. For this purpose, the 9821 contains 16 repertory registers, each capable of storing a 36-digit number. The operational sequence for storing a number in a repertory register is as follows:

(1) The **STORE** button is pressed simultaneously with a keypad button that corresponds to a repertory register. The 9821 now displays "StorE XX," where XX is the register number. Table 1-1 lists the keypad buttons and associated registers.

(2) The dialing mode and rate are selected.

(3) The number is dialed into the repertory register from the keypad. Dial pauses and break points are also inserted between digits, as necessary.

(4) The 9821 displays the digits from right to left as they are entered. If the number exceeds 12 digits, only the last 12 are shown. Dots appear for dial pauses and break points, as previously described.

(5) The **STORE** button is released; the number is now stored in memory. Although pauses and break points are not stored, their locations are remembered by the 9821 when the number is recalled at a later time.

If an error is made during keypad entry, the repertory register is cleared by simultaneously holding in the **STORE** button and pressing the **RECALL** button momentarily. The message "StorE XX" appears again, and the number can be redialed on the keypad. The **STORE** button must be held in throughout this sequence of steps.

If an incorrect repertory register is selected on the keypad, the **RECALL** button is pressed and held in, the **STORE** button is released, and the **RECALL** button is released. The register's contents are now displayed on the 9821 and preserved for future use. The correct register is subsequently accessed by performing step (1) above.

C. Data Recall

The 9821 is equipped with a recall function, which allows the test board operator to:

- out-dial from memory (repertory dialing),
- retrieve previous store-and-forward register contents, and
- display stored numbers with more than 12 digits.

(1) Repertory Dialing. A number in a repertory register can be fed to the store-and-forward register for automatic out-dialing. The **RECALL** button is pressed on the 9821, along with the keypad button corresponding to the repertory register in which the number is stored. The 9821 displays "rECALL XX" while these buttons are pressed; then the first 12 digits of the number are displayed. The memory contents are now in the store-and-forward register, and can be out-dialed by pressing the **SEND** button. The number remains in the repertory register for future use.

(2) Data Retrieval. The **RECALL** button is pressed to retrieve the store-and-forward register's previous contents. This can only be done if the **SEND** button was not pressed after the register contents were changed. The previous circuit can now be dialed.

(3) Digit Display. If the contents of the store-and-forward register exceed 12 digits, the **RECALL** button is used to display the entire digit string. The first 12 digits are seen when the button is momentarily pressed. If the numer has 13 digits or more and the **RECALL** button is held in for 2 seconds, the next 12 digits appear, with the first two on the left flashing. If the number has 25 digits or more and the **RECALL** button is held in for another 2 seconds, the last 12 digits are shown, with the first three flashing. The display cycle repeats itself every 6 seconds.

The contents of a repertory register can be seen in a similar fashion. The **RECALL** and appropriate keypad buttons (Table 1-1) are momentarily pressed at the same time. When they are released, the 9821 displays the first 12 digits, and the remaining ones can be seen by operating the **RECALL** button as described above.

D. Time-of-Day Clock

The 9821 displays the time of day when the **TIME** button is pressed. The hours, minutes, and seconds appear – each consisting of two digits – with the seconds automatically advancing. When the 9821 is initially powered up, the time is displayed in a 24-hour format, in which the hours advance sequentially from 01 to 24, and the minutes and seconds each advance from 00 to 59. The time can also be displayed in a 12-hour format, in which the hours advance from 01 through 12; the minutes and seconds are the same as those for the 24-hour format. Also, an "A" or a "P" follows the seconds digits in the 12-hour format, indicating a.m. or p.m., respectively.

(1) Setting the Time. The time of day is set by holding in the **TIME** button, while also pressing and holding in keypad buttons **A**, **B**, and **C**, one by one. These buttons control the hours, minutes, and seconds. If they are only momentarily pressed or if pressed and held in for less than 3 seconds, the associated digits advance slowly (in one-count increments) on the 9821 display panel. If these buttons are held in for more than 3 seconds, the digits advance rapidly.

Once the hours, minutes, and seconds are set, the **TIME** and keypad **D** buttons can be simultaneously pressed to change the time display from the 24-hour format to the 12-hour format.

(2) Synchronization. The 9821 clock can be synchronized to an external timer. First, the **TIME** and **C** buttons are simultaneously pressed and held in until the seconds on the 9821 are slightly ahead of those on the external clock. The **C** button is then released; however, the seconds do not advance on the 9821. When the external timer catches up, the **TIME** button is released and the two clocks are synchronized.

(3) Clearing the Display. The time-of-day display is cleared by pressing any keypad button on the 9821, or by pressing the **RECALL**, **STORE**, or **SEND** button. Also,

if the 9821 is depowered, all information stored in memory is lost and the time must be reset.

(4) Display During Operation. The time of day can be observed on the 9821 by pressing the **TIME** button. However, this display cannot be observed if one of the following conditions exists:

(a) The 9821 is in a storage mode (**STORE** button pressed and digits being entered into a register).

(b) Out-dialing is in progress or is interrupted by a pause, break point, or stop-dial input.

1.03 SPECIFICATIONS

Table 1-2 lists the electrical specifications for the dialer of the 9820A and 9821.

Table 1-1. 9821 Display Messages

DISPLAY MESSAGE	DESCRIPTION
01 (on far right of display)	Indicates the 9821 software version. Momentarily displayed only when power is initially applied. First issue = 01.
012345678901	Typical display of digits in a store-and-forward or repertory (memory) register of 9821. Up to 12 digits are displayed at one time.
(Highlighted digit)	Indicates digit currently being out-dialed from 9821. All other digits are dimmed on display window.
(Flashing digit)	Indicates an interruption of out-dialing due to a dial pause, two-stage dialing break point, or externally applied stop-dial command. Flashing digit is next one to be sent out when dialing resumes.
9696500.1234	Indicates a typical string of digits with a dial pause or two-stage break point inserted. Solid dots indicate dial pauses entered by test board operator via **PAUSE** button when dialing into storage. Flashing dots indicate break points where dialing mode and/or rate are changed.
Stor And For	This message appears when **STORE** button is pressed. It indicates that the store-and-forward register is ready to accept dialed digits from the keypad. Up to 36 digits can be dialed in, along with the required dial pauses and break points.
StorE 01	Indicates that repertory register 01 is ready to store a number. This message appears when the **STORE** button and keypad button **1** are simultaneously pressed and held

(continued)

Table 1-1. 9821 Display Messages (Continued)

DISPLAY MESSAGE	DESCRIPTION
StorE 01 (continued)	in. Up to 16 numbers can be stored in memory, using **STORE** and the following keypad buttons: Button — Register No. **0** through **9** — 00 through 09 ***(KP)** — 10 **#(ST)** — 11 **A** — 12 **B** — 13 **C** — 14 **D** — 15
rECALL 01	Indicates the repertory register whose contents will be recalled for out-dialing and display. This message appears when **RECALL** and a keypad button above are momentarily pressed at the same time. When buttons are released, repertory register's contents are fed to a send register for out-dialing and are displayed on 9821 front panel.
(Two or three flashing digits)	If a number has more than 12 digits and **RECALL** button is pressed and held in for 2 seconds, 9821 displays next 12 digits of sequence. First two digits on left flash. If number has more than 24 digits and **RECALL** is held in for 4 seconds, the last 12 digits are shown, and the first three in that set are flashing.
21 43 05	Indicates time of day (hours, minutes, and seconds) in continuous, 24-hour mode when **TIME** button is pressed. Hours advance from 01 to 24, minutes = 00 to 59, and seconds = 00 to 59.
09 43 05 P	Time of day in 12-hour mode. Hours = 01 to 12; minutes and seconds are same as above. Also, A = a.m. and P = p.m. This message appears when the 24-hour format is shown and the **TIME** and **D** buttons are subsequently pressed on the 9821.

Table 1-2. 9820A/9821 Dialer Specifications

DIALER TONE FREQUENCIES:	
DTMF Tones:	Within +0.4% and -0.5%: 697 Hz 1209 Hz 770 Hz 1336 Hz 852 Hz 1477 Hz 941 Hz 1633 Hz
MF Tones:	Within +0.15% and -0.55%: 700 Hz 1300 Hz 900 Hz 1500 Hz 1100 Hz 1700 Hz
DTMF/MF TONE LEVELS:	
Nominal Level:	-6 dBm0 (6 dB below TLP).
Front Panel Adjustment Range:	20 dB, varying from +7 to -25 dBm0, depending upon setting of rear panel control.
Output Impedance:	900 ohms (telephone line); 600 ohms (test circuit).
Level Accuracy:	±0.1 dB, relative to level at any one tone frequency.
Level Stability:	±0.5 dB, relative to any single tone frequency.
Harmonic Distortion:	<1% (<-40 dB).
TELEPHONE LINE INTERFACE:	
Loop Current:	30 mA, with ≥4V across telephone line.
HEADSET INTERFACE:	
Gain Adjustment:	-34 to +6 dB (headset transmitter to telephone line or test circuit). Nominal gain = 0 dB. -32 to +16 dB (telephone line to headset receiver). Nominal gain = -12 dB. -32 to +8 dB (test circuit to headset receiver). Nominal gain = -12 dB.
SF Microphone Notch Filter:	>40 dB down from 2595 to 2605 Hz (to prevent talk-off on SF circuits).

(continued)

Table 1-2. 9820A/9821 Dialer Specifications (Continued)

TEST CIRCUIT INTERFACE WITH 9830 TEST SELECTOR:	
Transmission Levels:	Send: 0 dBm at 900 ohms (telephone line). 0 dBm at 600 ohms (test circuit RCV). Receive: 0 dBm at 600 ohms (test circuit XMT). 0 dBm at 900 ohms (telephone line).
Frequency Response:	DC coupled; ±0.5 dB from 300 to 3400 Hz (relative to level at 1004 Hz).
DIALING MODES AND RATES:	
Dial Pulsing:	Normal Dialing output rate: 10 ±0.2 pps output at 59.7% to 63% break (TTL-equivalent signal from 9820A/9821, applied to 9830 Test Selector) or 58% to 62% break (measured at 9825 or 9826 Tel Line Selector output). Nominal = 60% break. Fast Dialing: 20 ±0.4 pps; same percent break as above. Interdigital Pause: 650 ±5 ms.
DTMF Dialing:	Normal Rate: 5 characters per second. Tones on for 100 ±5 ms, off for 100 ±5 ms. Fast Dialing: 10 characters per second. Tones on for 50 ±5 ms, off for 50 ±5 ms.
MF Dialing:	Normal Rate: 7 characters per second. Tones on for 68 ±5 ms, off for 68 ±5 ms. KP on for 100 ±5 ms. Fast Dialing: 10 characters per second. Tones on for 35 ±5 ms, off for 65 ±5 ms. KP intervals are same as for normal rate above.

SECTION II

PERFORMANCE VERIFICATION

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2. INTRODUCTION

This section contains performance verification procedures for the WILTRON Model 9820A and 9821 Communications Panels. These tests check operability of the 9820A and 9821 in the 9800 Series Test Boards.

For certain tests, the operator is referred to the 9820 procedures in the 9800 Operation and Maintenance Manual. With slight modifications, these procedures can be applied to the 9820A and 9821, and so are not repeated in this manual.

2.01 TEST EQUIPMENT REQUIRED

A digital voltmeter (3-1/2 digits) is needed to perform the tests in this section. Also, a transmission measuring set (WILTRON 9102A DTMS or equivalent), a signaling test set (WILTRON 9361B or equivalent), and various patch cords are needed. The DTMS and 9361B are integral parts of the WILTRON 9806 and 9808 Test Boards.

2.02 PERFORMANCE VERIFICATION PROCEDURES

The performance verification procedures are arranged as follows:

- Preliminary checks
- Dialer function verification
- Telephone line and interbay trunk verification
- Test circuit interface checks
- Final adjustments

A. Preliminary Checks

Table 2-1 is the 9820A/9821 preliminary checkout procedure. In this test, the power supply voltages are measured, and various indications are observed on the front panel. Figure 2-1 shows the rear panel of the power supply assembly.

B. 9820A and 9821 Dialer Verifications

After the preliminary checks are completed, the dialer circuits and functions must be verified. Table 2-2 checks out the 9820A dialer, and Table 2-3 checks out the 9821 dialer and display panel. These tests are performed to verify the basic operations (automatic out-dialing sequence on 9820A/9821 and the display messages on the 9821).

Table 2-4 verifies two-stage dialing and dial-pause operation. Table 2-5 is used to verify the following additional functions: stop-dial, wink-start, and dial-pulsing rates (normal and fast). The tests in Table 2-5 are performed through the 9830 Test Selector on the test board; also, a 9361B Signaling Test Set (or equivalent) is needed.

Table 2-6 verifies the DTMF and MF single-tone frequencies of the 9820A and 9821 dialers. A 9102A DTMS (or equivalent instrument with frequency-measurement capability) is needed for this procedure.

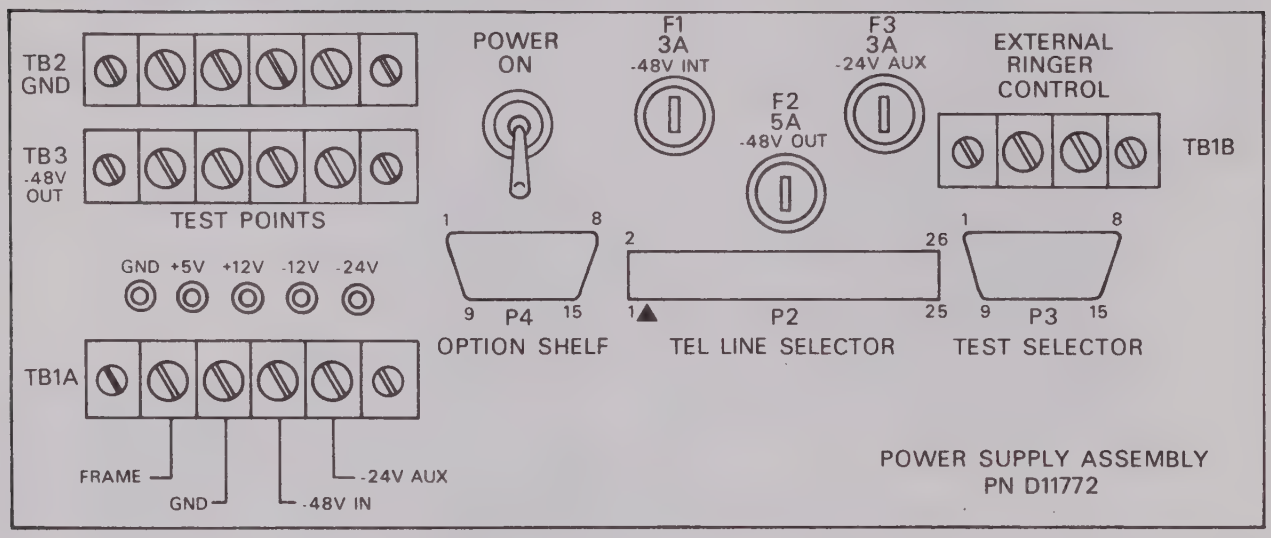

Figure 2-1. Rear Panel of Power Supply Assembly

Table 2-1. 9820A, 9821 Preliminary Checks

STEP	PROCEDURE	RESULT
1	Verify that **POWER** switch on 9820A or 9821 power supply assembly backplane is turned off (see Figure 2-1).	------
2	Connect ground and -48V from central office to **TB1A** pins 2 and 3 of power supply assembly (via circuit breaker or fuse panel).	------
3	On 9820A or 9821, operate **HEADSET TEL LINE** switch, and set **TRMTR**, **RCVR**, and **DTMF/MF LEVEL** controls to midrange. Also set **SPEAKER VOLUME** control to OFF.	------
4	Using digital voltmeter (DVM), measure dc voltages at pins 1 through 4 of **TB1A** on power supply assembly rear panel. Connect meter ground lead to **GND** test point on assembly rear panel.	DVM reads 0V at pins 1, 2, and 4, and -48V at pin 3 (left to right).
5	On rear panel of power supply assembly, set **POWER** switch to **ON**. Observe front-panel indications.	The following indications appear: a. On 9821, software version number is momentarily displayed (two digits; 01 = first release). b. **DP** lamp is lit on 9820A or 9821 front panel. c. No other lamps are lit.
6	Measure dc voltages at **TB3** and **TB2** pins on power supply assembly rear panel.	DVM reads -48V on **TB3** pins and 0V on **TB2** pins.
7	Using DVM, measure dc voltages at **+5V**, **+12V**, **-12V**, and **-24V** test points on power supply assembly rear panel. Connect DVM ground probe to **GND** test point.	DVM readings are as follows: +5V, ±0.1V +12V, ±0.2V -12V, ±0.2V -24V, ±0.5V
8	With DVM ground probe connected to pin E3 or F3 of **TB4** on 9865 Jackfield backplane, measure dc voltages at the following **TB4** pins: E1 E5 E2 E6 E4 F6 F4 Note: Refer to 9800 Installation Manual for 9865 backplane detail.	DVM readings are as follows: Pin E1: 0V Pin E2: +9V, ±2.0V Pin E4: -23V to -16V (nominal = -18V) Pin F4: +16V to +23V (nominal = +18V) Pin E5: 0V Pin E6: -24V ±1.0V Pin F6: -44V to -56V (nominally -48V)

Table 2-1. 9820A, 9821 Preliminary Checks (Continued)

STEP	PROCEDURE	RESULT
9	Disconnect DVM.	------
	NOTE If a 9820A Communications Panel is used, this procedure is complete; go to Table 2-2. If a 9821 is used, also perform the following steps.	
10	On 9821, press **TIME** button.	9821 display reads 24 YY ZZ (hours, minutes, seconds). Seconds automatically advance in 1-second intervals.
11	Press and hold **TIME** button and keypad button **A** in at the same time.	Hours advance slowly for first 3 seconds that these buttons are held in, then advance rapidly until buttons are released.
12	Press and hold **TIME** and keypad **B** buttons in.	Same as step 11 for minutes.
13	Press and hold **TIME** and keypad **C** buttons in.	Same as step 11 for seconds.
14	Press and hold **TIME** button in while also momentarily pressing button **D** on keypad.	9821 display reads XX YY ZZ A (or P) (hours, minutes, seconds, and either a.m. or p.m.).
15	Repeat step 14.	Display is same format as step 10 (no a.m. or p.m. digit).
16	Press any keypad button (except **D**).	Time display clears. Procedure is completed. Go to either Table 2-2 (9820A) or Table 2-3 (9821).

Table 2-2. 9820A Dialer Circuit Verification

STEP	PROCEDURE	RESULT
1	On 9820A, enter a number into storage, as follows:	
	a. Press **DP**, **DTMF**, or **MF** button to select dialing mode.	a. Associated front-panel lamp is lit.
	b. For fast dialing, also press **FAST DIAL** button.	b. **FAST DIAL** lamp is lit.
	c. Momentarily press **STORE** button.	c. Send register is ready to accept digits.
	d. On keypad, dial a telephone-line number (or other string of digits).	d. Number is stored, but not out-dialed.
	NOTE: Up to 36 digits can be dialed into storage. Any additional ones are not stored in the 9820A.	
2	Set other front panel controls as follows:	
	a. Operate **TEST CKT** switches of dialer, headset, and speaker.	a. Associated lamps are lit. Also, **HEADSET RCV ONLY** lamp is lit.
	b. Set **HEADSET TRMTR** and RCVR controls and **DTMF/MF LEVEL** control to midrange.	b. 9820A is ready for out-dialing from storage.
	c. Set **VOLUME** control to midrange.	
3	Momentarily press **SEND** button.	The following actions occur:
		a. Stored digits are automatically dialed, in mode and at speed previously selected.
		b. **SEND** lamp flashes as each digit is out-dialed.
		c. **DTMF** and **MF** tones are audible.
		d. **SEND** lamp goes out when dialing is completed.
4	Repeat step 3 for the other dialing modes. For normal dialing rate, press **FAST DIAL** button to extinguish associated lamp.	Same as step 3.
5	Press **STORE** button and then press **SEND** button.	Out-dialing is disabled (data previously stored in 9820A is cleared).
		Procedure is completed. Go to Table 2-4.

Table 2-3. 9821 Dialer Circuit Verifications

STEP	PROCEDURE	RESULT
	MEMORY AND DISPLAY CHECKS	
1	On 9821, press **DP, DTMF**, or **MF** button.	Associated lamp is lit.
2	While pressing and holding **STORE** button in, also do the following:	
	a. Momentarily press button **1** on keypad.	a. 9821 displays "StorE 01" (repertory register 01 is ready to accept dialing data).
	b. Dial a 36-digit number on keypad.	b. Digits fill display panel in order dialed, from right to left.
	NOTE: If an error is made during dialing, hold **STORE** button in, momentarily press **RECALL** button, then redial entire number into memory.	
3	Release **STORE** button.	Number is stored in repertory register 01; first 12 digits are displayed from left to right.
4	Press **STORE** button, and then press **SEND** button.	Display is blank; number remains in memory.
5	On 9821, momentrily press **RECALL** button and keypad button **1** at the same time; then release button **1**.	9821 displays "rECALL 01," then displays first 12 digits of number in step 1. Also, dialing mode lamp of step 1 is lit.
6	Press and hold **RECALL** button in for 2 seconds.	Next 12 digits of number are displayed, with first two digits on left blinking.
7	Press and hold **RECALL** button in for another 2 seconds.	Last 12 digits are shown, with first three blinking.
	STORE-AND-FORWARD REGISTER/AUTOMATIC OUT-DIALING CHECK	
8	Momentarily press **STORE** button.	9821 displays "Stor And For."
9	Select appropriate dialing mode and rate, and dial another number on keypad.	Digits are displayed (but not out-dialed).
10	On 9821:	
	a. Operate **TEST CKT** switches of dialer, headset, and speaker.	a. Associated **TEST CKT** lamps are lit. Also, **STOP DIAL** lamp is lit.

Table 2-3. 9821 Dialer Circuit Verifications (Continued)

STEP	PROCEDURE	RESULT
	STORE-AND-FORWARD REGISTER/AUTOMATIC OUT-DIALING CHECK (CONTINUED)	
(10)	b. Set following controls to midrange: **HEADSET TRMTR** and **RCVR**, **MF/DTMF LEVEL**, and **VOLUME**.	b. **HEADSET RCV ONLY** lamp is lit when **VOLUME** is midranged.
11	Press **SEND** button.	The following actions occur: a. Each digit is highlighted on display panel as it is out-dialed. b. **SEND** lamp flashes as digits are sent. c. DTMF or MF tones are audible on speaker. d. Dialing mode and speed are indicated by lamps lit on 9821. e. At end of out-dial interval, **SEND** lamp goes out and first 12 digits of line number are displayed.
12	Repeat step 11 for other dialing modes. For fast dialing, press **FAST DIAL** button.	Same as step 11. If fast dialing is used, **FAST DIAL** lamp is also lit, and digits are out-dialed at a faster rate.
13	On keypad, dial another number.	In dial-pulse mode, digits are highlighted as they are sent out. DTMF and MF tones are audible on speaker.
14	Press **RECALL** button.	First 12 digits of number in step 9 are displayed (but not out-dialed).
15	Press **STORE** button, and then press **SEND** button.	Display is blank (store-and-forward register is cleared).
	CHECK REPERTORY DIALING	
16	Momentarily press **RECALL** button and keypad button **1** at the same time, then release button **1**.	First 12 digits of number in repertory register 01 are displayed.
17	Press **SEND** button.	Number is out-dialed (see step 11 for proper results).

Table 2-3. 9821 Dialer Circuit Verifications (Continued)

STEP	PROCEDURE	RESULT
	VERIFY MEMORY CLEARED	
18	Momentarily press **STORE** button and keypad button **1** at the same time.	9821 displays "StoreE 01" when both buttons are pressed, and then display goes blank.
19	Press **RECALL** button and keypad button **1** at the same time.	9821 displays "rECALL 01" and then display is blank (repertory register 01 is cleared). Procedure is completed. Go to Table 2-4.

Table 2-4. Two-Stage Dialing and Dial-Pause Verification

STEP	PROCEDURE	RESULT
	TWO-STAGE DIALING CHECK	
1	On 9820A or 9821, enter a number into storage as follows:	
	a. Press **DP** button.	a. **DP** lamp is lit (dial-pulsing selected).
	b. Press **STORE** button.	b. On 9821, "Stor And For" is displayed (ready to store digits).
	c. On keypad, dial **1234567**.	c. On 9821, digits are displayed from left to right.
	d. Press **MF** button.	d. **MF** lamp is lit (**MF** selected for remaining digits).
	e. On keypad, dial ***89012345#**.	e. 9821 displays last 12 digits of dialed number; flashing dot indicates mode-change location (break point).
2	Operate **TEST CKT** switches of dialer, headset, and speaker.	**TEST CKT** lamps are lit on 9820A/9821.
3	Set the following controls to midrange: **DTMF/MF LEVEL, HEADSET TRMTR** and **RCVR**, and **SPEAKER VOLUME**.	**HEADSET RCV ONLY** lamp is also lit when **VOLUME** control is at midrange.

Table 2-4. Two-Stage Dialing and Dial-Pause Verification (Continued)

STEP	PROCEDURE	RESULT
	TWO-STAGE DIALING CHECK (CONTINUED)	
4	Press **SEND** button one time.	The following actions occur: a. First group of digits are sent out as dial pulses. b. On 9821, display shows break point and highlights next digit (also flashing) to be sent. c. On 9820A and 9821, **SEND** lamp flashes with each out-dialed digit, and stays lit when break point is reached. d. **MF** lamp is lit; **DP** lamp goes out (dial mode is now changed for remaining digits).
5	Press **SEND** button again. NOTE: If number must be redialed to verify indications, repeat sets 4 and 5.	The following actions occur: a. Remaining digits are sent out as MF tones, and are highlighted on 9821 during out-dialing. b. MF tones are audible. c. At end of out-dial sequence, **DP** lamp is lit, and **MF** and **SEND** lamps go out. d. 9821 displays first 12 digits.
	DIAL-PAUSE VERIFICATION	
6	Press **STORE** button.	9821 displays "Stor And For."
7	Proceed as follows: a. Select a dialing mode, and dial **1234567** on keypad. b. Press **PAUSE** button. c. Dial **8901234** on keypad.	a. On 9821, digits are displayed. b. On 9821, solid dot appears after last digit dialed. c. Remaining digits are shown on 9821.
8	Press **SEND** button once.	Out-dialing occurs as described in step 4, in the mode and at rate selected. Solid dot indicates pause on 9821.

Table 2-4. Two-Stage Dialing and Dial-Pause Verification (Continued)

STEP	PROCEDURE	RESULT
	DIAL-PAUSE VERIFICATION (CONTINUED)	
9	Press **SEND** button again. NOTE: To redial number (if necessary), repeat steps 8 and 9.	Remaining digits are out-dialed in same mode as step 8. At end of out-dial interval, 9821 displays entire number.
10	Press **STORE** button; then press **SEND** button.	9820A/9821 storage is cleared. Procedure is completed. Go to Table 2-5.

Table 2-5. Dial-Pulsing, Stop-Dial, and Wink-Start Verifications

STEP	PROCEDURE	RESULT
	INITIAL PREPARATION	
1	On 9361B, operate the following switches: a. **SEND E&M** and **RCV E&M**, b. **CKT SPLIT TWD DROP**, c. **SEND ON HK** and **REV SUPV ON HK**, d. **RCV FROM DROP**, e. **E&M INTERFACE TYPE I**, and f. **DISPLAY PPS**.	------
2	On 9830, operate following switches: **2 WIRE**, **LINE**, **FWD SUPV OFF HK**, **TALK DIAL**, and **E&M**.	Associated lamps are lit.
3	Patch **E&M DROP** jack of 9361B to **E&M LINE** jack of 9865.	Signaling test set is ready for measurements.
4	On 9820A/9821:	
	a. Operate **TEST CKT** switches of dialer, headset and speaker.	a. Associated lamps are lit.
	b. Verify that **STOP DIAL** lamp is lit. If it is not, press **STOP DIAL** button.	b. **STOP DIAL** lamp is lit.
	c. Press **DP** button.	c. **DP** lamp is lit (dial-pulsing mode selected).
	d. Press **STORE** button.	d. 9821 displays "Stor And For."
	e. Dial **1234567890** (or any other random digit sequence).	e. 9821 displays digits from left to right.

Table 2-5. Dial-Pulsing, Stop-Dial, and Wink-Start Verifications (Continued)

STEP	PROCEDURE	RESULT
	DIAL-PULSING VERIFICATION	
5	On 9820A/9821, press **SEND** button.	Number is out-dialed; results are as follows: a. 9361B displays 10 ±0.5 pps. b. **SEND** lamp flashes on 9820A/9821 as pulses are sent out. c. 9821 highlights out-dialed digits. d. At end of out-dial, **SEND** lamp goes out. Also, 9821 displays entire number (or first 12 digits, if number has 13 or more digits).
6	Operate **DISPLAY %BRK** switch on 9361B, and repeat step 5.	9361B displays 59.5% to 60.5% break (nominally 60%). Other results are same as step 5.
7	On 9361B, operate **DISPLAY PPS** switch again.	------
8	On 9820A/9821:	
	a. Press **FAST DIAL** button.	**FAST DIAL** lamp is lit (fast dialing selected).
	b. Press **SEND** button.	Number is out-dialed per step 5; 9361B displays 20 ±0.5 pps. **FAST DIAL** lamp goes out when dialing ends.
	STOP-DIAL VERIFICATION	
9	On 9361B, operate **SEND OFF HK & DIAL** switch for about 1 second, and then operate **SEND ON HK** switch.	Outpulsing begins as described in step 5.
10	During outpulsing, operate **SEND OFF HK & DIAL** switch.	Outpulsing is interrupted; **SEND** lamp on 9820A/9821 stays lit. Next digit to be dialed out is flashing on 9821 display panel.
11	On 9361B, operate **SEND ON HK** switch.	Remaining digits are outpulsed as described in step 5.
12	Press **STOP DIAL** button on 9820A/9821, and repeat step 9.	**STOP DIAL** lamp goes out; no outpulsing occurs at time of transition from off-hook to on-hook.

Table 2-5. Dial-Pulsing, Stop-Dial, and Wink-Start Verifications (Continued)

STEP	PROCEDURE	RESULT
	WINK-START DIALING VERIFICATION	
13	On 9820A/9821: a. Press **STOP DIAL** button. b. Set the following controls to mid-range: **DTMF/MF LEVEL, HEADSET TRMTR** and **RCVR**, and **VOLUME.** c. Press **DTMF** button.	a. **STOP DIAL** lamp is lit. c. Associated lamp is lit.
14	On 9361B, repeat step 9.	Number is out-dialed; DTMF tones are audible on speaker.
15	On 9820A/9821, press **MF** button; then repeat step 9.	Number is out-dialed; MF tones are audible.
16	Remove patch cord of step 3 from test board, and press **STORE** and **SEND** buttons on 9820A/9821.	Number is cleared from storage; 9821 display panel is blank. Procedure is completed. Go to Table 2-6.

Table 2-6. DTMF and MF Single-Tone Verifications

STEP	PROCEDURE	RESULT
	INITIAL PREPARATION	
1	On 9820A/9821, press **DIALER TEL LINE** button, and operate **TEL LINE** switches of headset and speaker.	**SPEAKER TEL LINE** and **HEADSET RCV ONLY** lamps are lit.
2	On 9825/9826, operate an unused **TELEPHONE LINE SELECT** button, and operate **CONF BUS 1** or **2** switch. Also operate associated **TO TEST CKT SELECT** switch.	9820A/9821 dialer is conferenced to a test bus.
3	On 9830, operate the following switches: **TEL LINE, MEAS, 2 WIRE 600Ω**, and **OSC TMS.** Release **TALK DIAL** switch.	**MEAS** lamp is lit.
4	Adjust DTMS level/noise control panel to measure VF levels/frequencies at 600 ohms (terminated).	Ready to measure frequencies.

Table 2-6. DTMF and MF Single-Tone Verifications (Continued)

STEP	PROCEDURE	RESULT
	DTMF TONE CHECKS	
5	On 9820A/9821, press **DTMF** button and set **DTMF/MF LEVEL** control to midrange.	**DTMF** lamp is lit.
6	On keypad, simultaneously press and hold buttons **1** and **A** in, while observing DTMS display.	Display reads 697 Hz (+2.8 to -3.5 Hz). Level is between -21 and -1 dBm.
7	Repeat step 6 for the other DTMF single tones by simultaneously pressing the following pairs of buttons on keypad:	Display readings are as follows:
	a. **2** and **A**	a. 770 Hz (+3.1 to -3.9 Hz)
	b. **3** and **A**	b. 852 Hz (+3.4 to -4.2 Hz)
	c. **4** and **A**	c. 941 Hz (+3.8 to -4.7 Hz)
	d. **5** and **A**	d. 1209 Hz (+4.8 to -6.0 Hz)
	e. **6** and **A**	e. 1336 Hz (+5.3 to -6.6 Hz)
	f. **7** and **A**	f. 1477 Hz (+5.9 to -7.4 Hz)
	g. **8** and **A**	g. 1633 Hz (+6.5 to -8.1 Hz)
		NOTE: Each tone level is within ±1.0 dB of that in step 6.
	MF TONE CHECKS	
8	On 9820A/9821, press **MF** button.	**MF** lamp is lit.
9	Repeat step 6 for MF single tones by pressing the following pairs of buttons (one pair at a time):	Readings are as follows:
	a. **1** and **A**	a. 700 Hz (+1.1 to -3.9 Hz)
	b. **2** and **A**	b. 900 Hz (+1.4 to -5.0 Hz)
	c. **3** and **A**	c. 1100 Hz (+1.7 to -6.1 Hz)
	d. **4** and **A**	d. 1300 Hz (+2.0 to -7.2 Hz)
	e. **5** and **A**	e. 1500 Hz (+2.3 to -8.2 Hz)
	f. **6** and **A**	f. 1700 Hz (+2.6 to -9.3 Hz)
10	On 9825/9826, release switches previously operated in step 2. On 9820A/9821, press **STORE** and **SEND** buttons.	Procedure is completed. Go to Table 2-7.

C. Telephone Line and Interbay Trunk Verifications

After the dialer functions are verified, the 9820A or 9821 should be checked through a 9825 or 9826 Telephone Line Selector. This test procedure is provided in 2-9800-OMM, Table 4-4. It verifies the ability of the 9820A/9821 to interface with telephone lines and interbay trunks. When performing this test, note the following differences:

(1) In step 1 of Table 4-4, the **DP** button should be pressed to select dial-pulsing on the 9820A or 9821. This button is functionally identical to the **PULSE** switch on the 9820.

(2) In step 3, manually dial the number on the keypad, and observe the following results:

(a) On the 9820A and 9821, the **SEND** lamp flashes during out-dialing, and goes out when out-dialing ends.

(b) On the 9821, dial-pulse digits are highlighted as they are transmitted, and the first 12 digits of the number are displayed when out-dialing ends.

(3) If the number must be redialed in step 3, press the **SEND** button, and observe the same results as in step b. above.

(4) After completing the test, clear the 9820A/9821 storage by pressing the **STORE** button and then pressing the **SEND** button.

D. Test-Circuit Interface Verification

The procedures for verifying the 9820A or 9821 test-circuit applications are similar to those for the 9820 Communications Panel. Refer to Section IV of 2-9800-OMM for detailed procedures. Table 2-7 lists the exact locations of these tests, in which the 9830 or 9830M Test Selector is also used.

The 9820A/9821 can also be used to verify other functions of a 9830 or 9830M. The procedures in Table 4-5 of 2-9800-OMM are applicable for these tests.

NOTE

The **DP** button on the 9820A/9821 serves the same function as the **PULSE** switch on the 9820.

E. Final Adjustments

Table 2-8 is the procedure for adjusting the 9820A/9821 ringer volume and DTMF or MF transmitting level. The ringer level can be adjusted from -40 to 0 dBm when the **VOLUME** control is in its full clockwise position. When the **DTMF/MF LEVEL** control on the front panel is at mid-range, the associated rear-panel control of the headset assembly can be set for a level between -21 and -1 dBm0. Figure 2-2 shows the headset assembly rear panel.

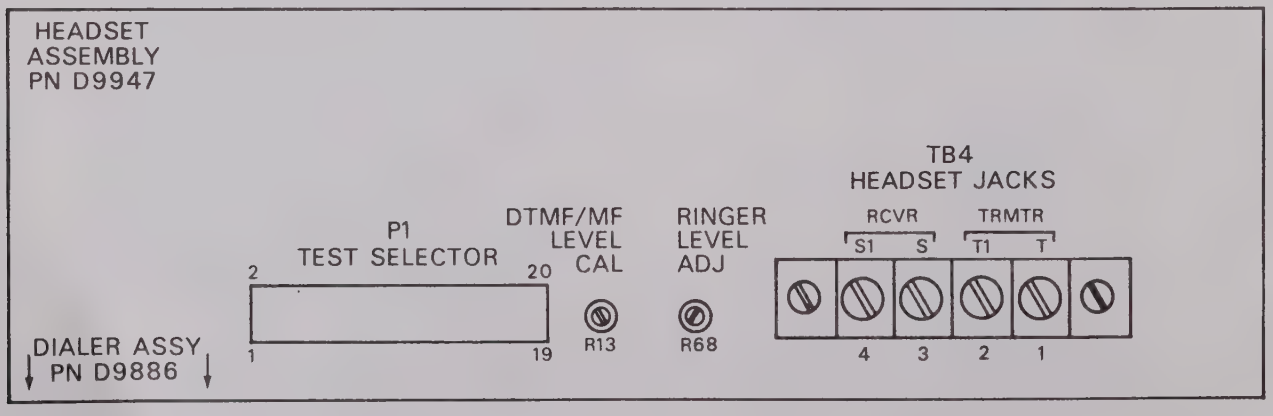

Figure 2-2. Rear Panel of Headset Assembly

Table 2-7. 9820A, 9821 Test Circuit Interface Verifications

FUNCTION TO BE VERIFIED	2-9800-OMM REFERENCE		
	TABLE	PROCEDURE	PAGE
DTMF or MF Dialing on Test Circuit	4-5	27	4-25
Headset or Dialer Connection to Test Circuit	4-5	8	4-15
Speaker Connection to Test Circuit	4-5	28	4-25
Telephone-Line Test Bus Connection to Test Circuit	4-5	17	4-19
Speaker Connection to Auxiliary Test Bus	4-6	AUX TEST	4-45

Table 2-8. 9820A and 9821 Level Adjustments

STEP	PROCEDURE	RESULT
	RINGER VOLUME	
1	On 9825 or 9826, operate an unused **TELEPHONE LINE SELECT** switch.	------
2	On 9820A or 9821:	
	a. Press **DTMF** and **DIALER TEL LINE** buttons.	a. **DTMF** lamp is lit on 9820A/9821 front panel.
	b. On keypad, dial up a telephone line for testing.	b. Ringing is heard on electronic ringer.
3	On headset assembly backplane of 9820A/9821 (Figure 2-2), set **RINGER LEVEL ADJ** control for desired loudness; then release **TELEPHONE LINE SELECT** switch on 9825/9826.	Volume adjustment is completed.
	DTMF OR MF OUTGOING LEVEL	
4	Adjust DTMS level/noise control panel to measure VF levels at 600 ohms (terminated).	
5	On 9830, operate the following switches: **2 WIRE, LINE, TALK DIAL, SEND, CAL SEND**, and **2W 600Ω**.	Dialer is connected to send bus.
6	On 9820A/9821:	
	a. Set **DTMF/MF LEVEL** control to midrange (calibrated) position.	------

Table 2-8. 9820A and 9821 Level Adjustments (Continued)

STEP	PROCEDURE	RESULT
	DTMF OR MF OUTGOING LEVEL (CONTINUED)	
(6)	b. Operate **DIALER TEST CKT** switch and press **DTMF** or **MF** button.	b. Associated lamps are lit.
	c. On keypad, simultaneously press and hold **1** and **A** buttons in.	c. Steady single tone is applied to DTMS level meter.
7	On headset assembly backplane (Figure 2-2), adjust **DTMF/MF LEVEL CAL** control for transmitting level 6 dB below TLP (nominally -6 dBm0).	DTMS displays desired DTMF or MF outgoing level.
8	Press **STORE** and **SEND** buttons on 9820A/9821 to clear storage circuits.	Dialer storage is cleared. Procedure is completed; 9820A/9821 is ready for operation. Go to Section III.

SECTION III

OPERATING PROCEDURES

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	B. Basic Dialer Operations	3-1
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3. INTRODUCTION

This section provides step-by-step operating procedures for the WILTRON 9820A and 9821 Communications Panels, as used in a 9800 Series Test Board. Each procedure is accompanied by test-setup illustrations that highlight the instrument controls and indicators used. A simplified test-connection diagram is also provided, when appropriate.

Before performing any of the procedures in this section, be sure to complete the installation and performance verification of the test board. Due to the complexity of the 9820A and 9821 dialers, it is recommended that the reader become familiar with the functions of all dialer controls before attempting any tests (see Section I). Also, read the following paragraphs prior to attempting any of these tests.

3.01 PROCEDURES

A. Setting the Time of Day

Table 3-1 is the procedure for setting the time of day on the 9821. This procedure should be performed first; repeat it whenever necessary. Also, if power is removed from the 9821, the time previously stored in memory is lost and must be reset.

The time-of-day display is cleared by pressing any dialer keypad button, or by pressing the **RECALL**, **STORE**, or **SEND** button. The time of day is not displayed during dialer operation (i.e., when dialing into or out of storage or memory). Once dialing is completed, press the **TIME** button to restore the time display.

B. Basic Dialer Operations

Table 3-2 is the procedure for storing frequently used numbers in the repertory registers of the 9821. This procedure should be performed after setting the time of day on the display panel. The stored numbers can be recalled at any time for future testing.

Table 3-3 is the procedure for out-dialing a number from the store-and-forward register of the 9820A or 9821. This procedure contains three parts: entering a number into storage, out-dialing it, and (in the 9821) retrieving and out-dialing a number from a repertory register. Use these procedures whenever it is more convenient to store the number in the dialer before accessing a circuit.

When a number is out-dialed from a repertory register of the 9821, it remains in memory for future use. However, if power is removed from the 9821, all numbers stored in memory are lost and must be dialed in again after power is restored. Also, the time of day must be reset.

NOTE

For the remaining procedures in this section (Table 3-4 and following), only the 9821 front-panel controls are shown. The 9820A does not have a display panel, **TIME** button, or **RECALL** button; however, its other controls are physically similar and functionally identical to those of the 9821.

C. Telephone-Line Testing

Tables 3-4 through 3-9 are the test procedures for telephone lines and interbay trunks. The 9825 or 9826 Telephone Line Selector is also used in these procedures. If a 9827 Telephone Line Expander is equipped, it also can be used. The 9820A or 9821 dialer is connected to the telephone line via the **DIALER TEL LINE** switch, and the number is then dialed.

D. Trunk-Circuit Testing

Tables 3-10 through 3-20 provide various trunk test procedures using the 9820A or 9821 dialer. These procedures are divided into two-wire circuit tests and four-wire circuit tests, and should only be used for trunks that do not utilize stop-go, wink-start, or delay dialing.

Prior to using these procedures, disable the stop-dial function by pressing the **DIALER TEST CKT** and **STOP DIAL** buttons on the 9820A or 9821. This function is disabled when the **STOP DIAL** lamp goes out.

Table 3-21 is the procedure for testing trunks with stop-go, wink-start, or delay dialing. In this procedure, circuit dialing is controlled by a supervision signal from the far-end trunk circuit (via the 9830 Test Selector). This signal is applied to the 9820A or 9821 dialer, which detects it and either dials the circuit or interrupts the outgoing digits until the far end is ready to accept them. Refer to Section I for a detailed description of the stop-dial and wink-start functions of the 9820A or 9821.

Because the 9820A or 9821 dialer in Table 3-21 is externally controlled, the steps for accessing the circuit and dialing it up are different from those in Tables 3-10 through 3-19. Therefore, be sure that the trunk to be tested is a stop-go, wink-start, or delay-dial trunk before using Table 3-21. If it is not, disable the stop-dial function as previously described, and go to the desired tests in Tables 3-10 through 3-19.

E. Other Test Procedures

The 9820A and 9821 can also perform several monitoring tests, in which the dialer is not used. These procedures are identical to the ones for the 9820 and require the use of only the headset and/or speaker. Refer to 2-9800-OMM, Section II for the following tests:

- Two-wire monitor-thru: page 2-10.
- Two-wire talk bridged: page 2-12.
- Two-wire talk battery, split to line or drop: page 2-24.
- Two-wire howler, split to line or drop: page 2-26.
- Four-wire line or drop monitor-thru: page 2-60.
- Four-wire talk, bridged to line or drop with bridged listening: page 2-62.
- Audio monitoring of measured levels and noise: page 2-84.
- Audio monitoring of measured impulse noise: page 2-86.

Table 3-1. Setting Time of Day on 9821 Communications Panel

STEP	PROCEDURE
1	On 9821, press **TIME** button and observe the following display message: XX YY ZZ
2	Set hours (XX) by simultaneously pressing and holding **TIME** and keypad **A** buttons in. Hours advance from 01 to 24. NOTE If button **A** is held in for more than 3 seconds, hours advance rapidly until button is released.
3	Set minutes (YY) by releasing button **A** and pressing **TIME** and **B** buttons on keypad. Minutes advance from 00 to 59 (slowly for first 3 seconds that **B** button is held in).
4	Set seconds (ZZ) by releasing **B** button and pressing **TIME** and **C** buttons. Seconds also advance from 00 to 59.
5	When seconds on 9821 are ahead of external clock, continue to hold **TIME** button in and release **C** button. Verify that seconds digits do not advance.
6	When external clock catches up with 9821, release **TIME** button. Time of day on 9821 is now synchronized to external clock.
7	Select desired display mode by momentarily pressing **TIME** and **D** buttons at the same time. Verify one of following displays: XX YY ZZ (24-hour mode; XX = 01 to 24). XX YY ZZ A (12-hour mode: A = a.m.; P = p.m.; XX = 01 to 12).
8	To clear time-of-day display, press **RECALL** or **SEND** button.

9821 COMMUNICATIONS PANEL

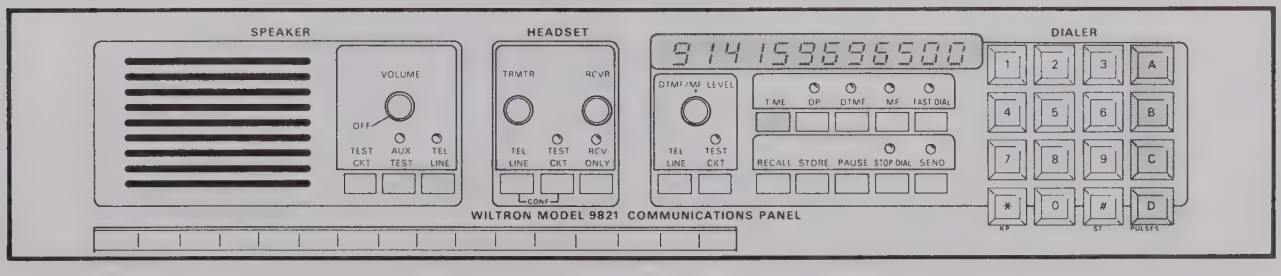


Table 3-2. Storing Numbers in Memory on 9821 Communications Panel

STEP	PROCEDURE
1	Select a number for dialing into a repertory register.
2	Press **DP**, **DTMF**, or **MF** button to select desired dialing mode. Also press **FAST DIAL** button if number will be fast-dialed. **FAST DIAL** lamp is lit when this rate is selected.
3	Press and hold **STORE** and keypad **0** buttons in at the same time, and verify that 9821 displays "StorE 00" (repertory register 00 is ready to store a number).
4	With **STORE** button still held in, proceed as follows: a. Release keypad **0** button. b. Dial desired number on keypad, and verify that digits are displayed. If more than 12 digits are dialed, only last 12 dialed are shown. Maximum storage capacity is 36 digits. NOTE If an error is made during entry, continue holding **STORE** button in and momentarily press **RECALL** button to clear register; then redial number. ("StorE 00" appears when **RECALL** is released.) c. For two-stage dialing, change dial mode and/or rate by pressing button(s) of step 2 at appropriate time during keypad entry. Flashing dot on display indicates two-stage break point. d. When necessary, insert pauses between digits by pressing **PAUSE** button once for each pause. Solid dots on display panel indicate pauses.
5	After completing steps 4a through 4d, release **STORE** button. Number is now stored in repertory register 00.
6	Repeat steps 2 through 5 for the other numbers and repertory registers, by pressing **STORE** and the following keypad buttons:

Keypad Button	Register
1 through **9**	01 - 09
*** (KP)**	10
# (ST)	11
A	12
B	13
C	14
D	15

9821 COMMUNICATIONS PANEL

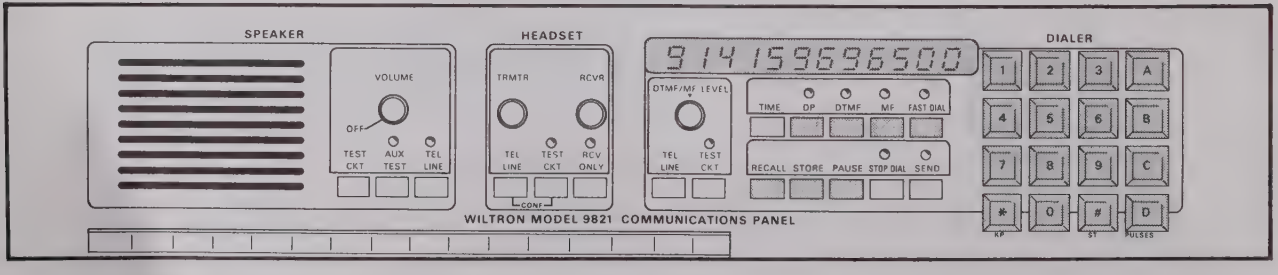


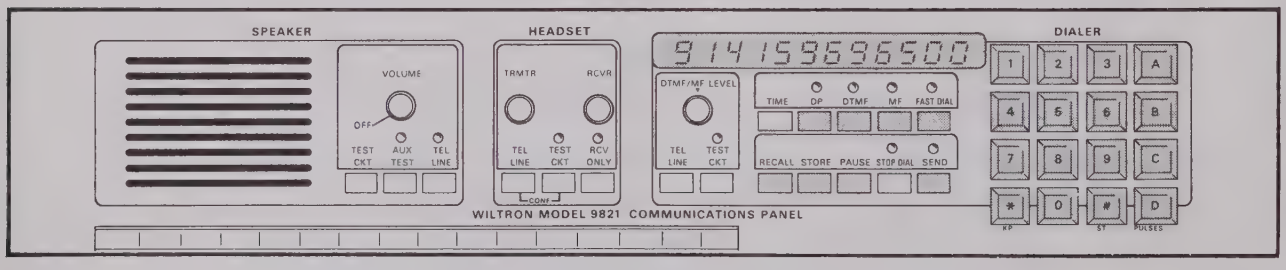
Table 3-3. 9820A/9821 Automatic Out-dialing

STEP	PROCEDURE
	STORING A NUMBER IN STORE-AND-FORWARD REGISTER
1	Select desired dialing mode and rate by pressing appropriate **DIALER** buttons (**DP**, **DTMF**, or **MF**; also **FAST DIAL** if fast dialing is needed).
2	Momentarily press **STORE** button, and verify that 9821 displays "Stor And For" after button is released.
3	Dial number (up to 36 digits) on keypad. If necessary, insert a pause between two digits by pressing **PAUSE** button. Also, for two-stage dialing, change dialing mode and/or rate by pressing button(s) in step 1 when changeover is required in digit string. NOTE If an error is made during data entry, momentarily press **STORE** button to clear store-and-forward register. Number can now be redialed.
4	On 9821, verify following displays when entering data for storage: a. Digits fill display panel from right to left as they are dialed on keypad. If more than 12 digits are dialed, only last 12 dialed are shown. b. Solid dots indicate pauses, and flashing dots indicate two-stage break points in digit string.
5	To observe entire digit string on 9821, proceed as follows: a. Press **RECALL** button and verify that first 12 digits (and dots) are displayed. b. If number has 13 or more digits, press and hold **RECALL** button in for 2 seconds, and verify that next 12 digits are displayed. c. If number has 25 or more digits, press and hold **RECALL** button in for 2 more seconds, and verify that last 12 digits are displayed.
	OUT-DIALING FROM STORE-AND-FORWARD REGISTER
6	Refer to appropriate test procedure, and make necessary connections to circuit under test. NOTE For trunks with stop-go, wink-start, or delay dialing, go to Table 3-21 for out-dialing.
7	On 9821, press **RECALL** button to retrieve a number in store-and-forward register.
8	Press **SEND** button to out-dial number in steps 2 through 5 above. NOTE During dialing, **SEND** lamp flashes. When dialing is interrupted (by a dial-pause, break point or stop-dial), **SEND** lamp stays lit. On 9821, next digit to be sent out flashes.
9	When a pause or break point is reached, press **SEND** button again to resume out-dialing. **SEND** lamp goes out when out-dialing ends. NOTE On 9820A, number stored in store-and-forward register is lost after out-dialing if another number is dialed on keypad.

Table 3-3. 9820A/9821 Automatic Out-dialing (continued)

STEP	PROCEDURE
	OUT-DIALING FROM STORE-AND-FORWARD REGISTER (CONTINUED)
10	If necessary, redial number by pressing **SEND** button per steps 8 and 9 above. After circuit is dialed, perform necessary measurements.
	REPERTORY DIALING (9821 ONLY)
11	Simultaneously press **RECALL** button and a keypad button associated with the repertory register in which desired number is stored. See Table 3-2, step 5 for keypad buttons. NOTE Keypad button (repertory register number) can be changed at any time if **RECALL** button is held in.
12	Refer to appropriate procedure in this section, and set **DIALER**, **HEADSET**, and **SPEAKER** controls accordingly. NOTE For trunks with stop-go, wink-start, or delay dialing, refer to Table 3-21 for out-dialing.
13	Dial number by pressing **SEND** button, as described in steps 8 and 9. If a redial is necessary, repeat those steps. When circuit is dialed, perform the necessary measurements.

9821 COMMUNICATIONS PANEL



9820A COMMUNICATIONS PANEL

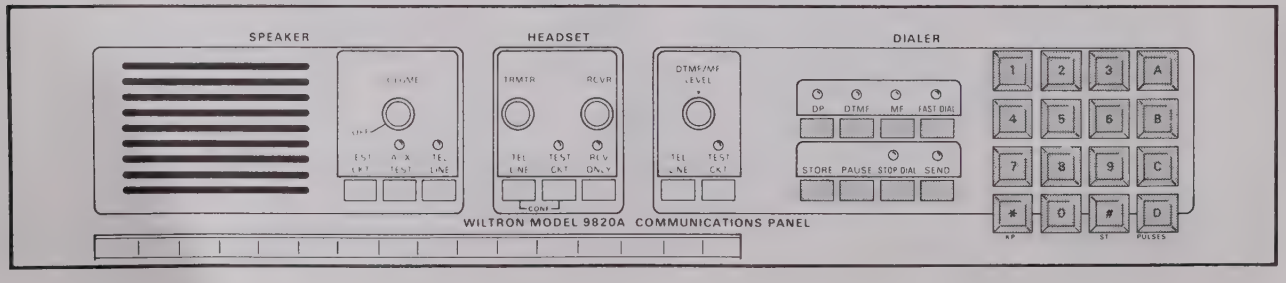
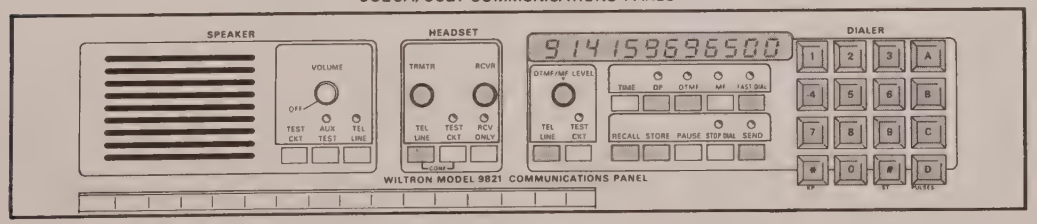


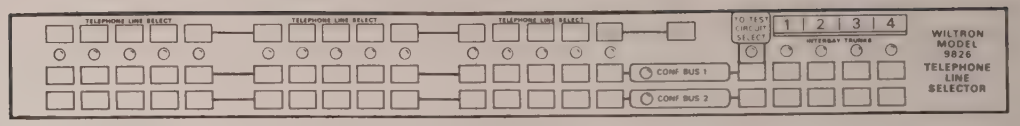
Table 3-4. Telephone Call Operations

STEP	PROCEDURE
1	To place a telephone call: a. On Communications Panel: (1) Press **DIALER TEL LINE** and **HEADSET TEL LINE**. (2) Adjust **TRMTR** and **RCVR** for desired transmitting and listening levels. (3) Press **DP** or **DTMF** for desired dialing mode. In DTMF mode, adjust **DTMF/MF LEVEL** to set dialer output level (nominally -6 dBm0 at midrange). NOTE If **SPEAKER TEL LINE** and **HEADSET TEL LINE** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. (4) For fast dialing, also press **FAST DIAL**. Associated lamp is lit. b. On Tel Line Selector Panel, operate unused **TELEPHONE LINE SELECT**. c. On Communications Panel, listen for dial tone and manually dial desired number on keypad according to local practices. For automatic out-dialing, refer to Table 3-3.
2	To receive a telephone call: a. On Communications Panel, operate **HEADSET TEL LINE** and adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. b. On Tel Line Selector Panel, operate the **TELEPHONE LINE SELECT** button whose indicator is flashing at 60 ipm to indicate an incoming call. c. Talk to the caller.
3	To hold a call: a. On Tel Line Selector Panel: (1) Operate **HOLD** to place a call on hold. **TELEPHONE LINE SELECT** LED flashes at 120 ipm for telephone line on hold. (2) Release all operated **TELEPHONE LINE SELECT** buttons. b. To reselect a line on hold, operate the **TELEPHONE LINE SELECT** button.
4	To perform measurements on an incoming or outgoing telephone call after placing a call (Step 1) or receiving a call (Step 2), refer to Table 3-5.

9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

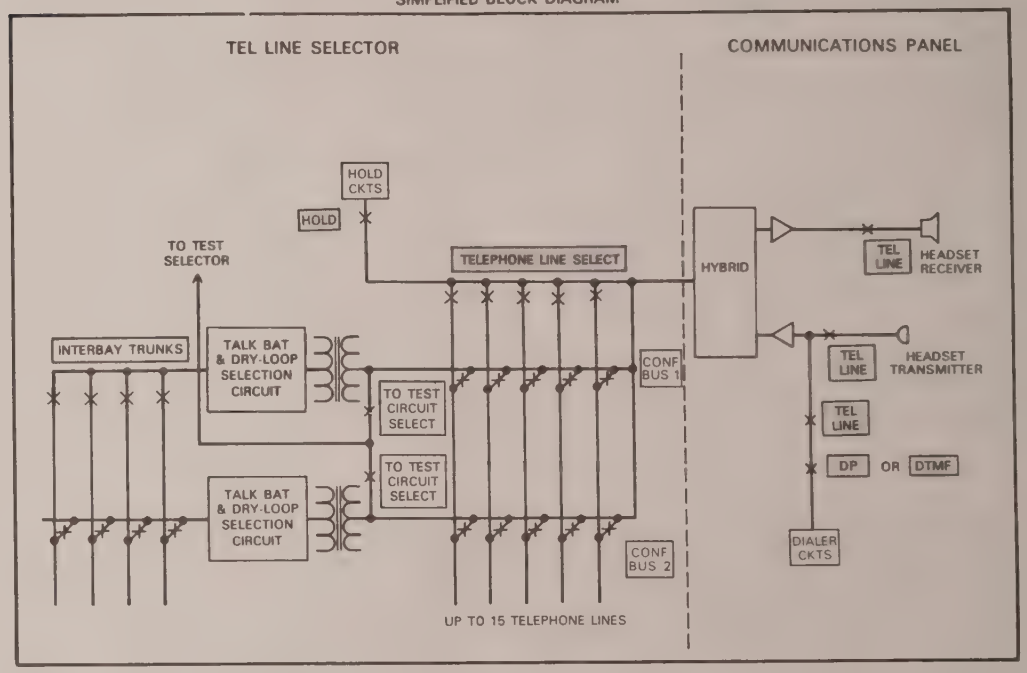
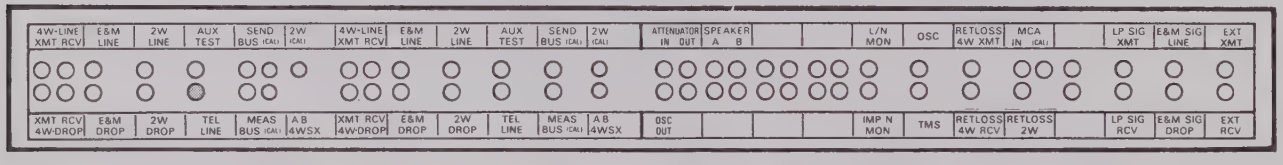


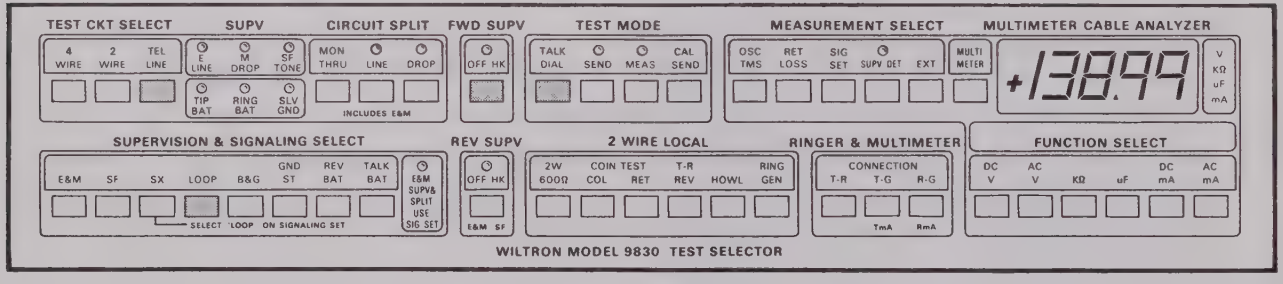
Table 3-5. Telephone Line Measurements

STEP	PROCEDURE
1	On Tel Line Selector Panel: a. Depending upon which conference bus is unused, operate **CONF BUS 1** or **CONF BUS 2** button directly below the **TELEPHONE LINE SELECT** button operated in Table 3-4, step 1b. or 2b. b. Operate **TO TEST CKT SELECT** button on same conference bus selected in step a. above.
2	On Test Selector, operate following switches: a. **LOOP** b. **FWD SUPV OFF HK** c. **TALK DIAL** d. **TEL LINE** NOTE At this time, line is double-terminated.
3	On Communications Panel, operate **HEADSET TEST CKT.**
4	On Tel Line Selector, release **TELEPHONE LINE SELECT.** Test Selector now controls supervision and line is properly terminated.
5	Perform necessary measurements (via **TEL LINE** jack on 9865).

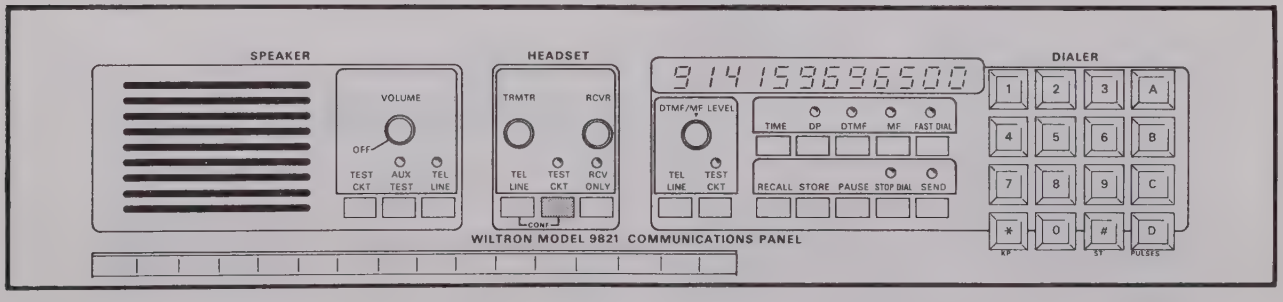
9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL



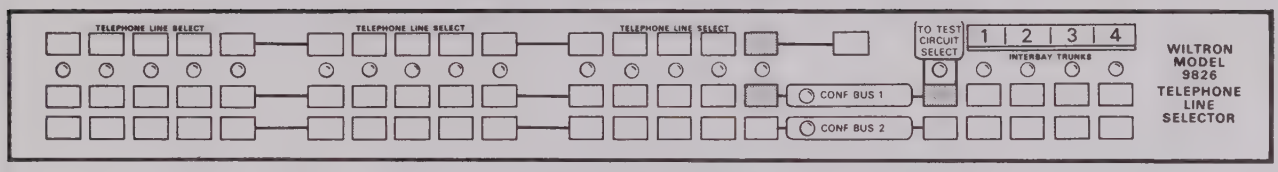
9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

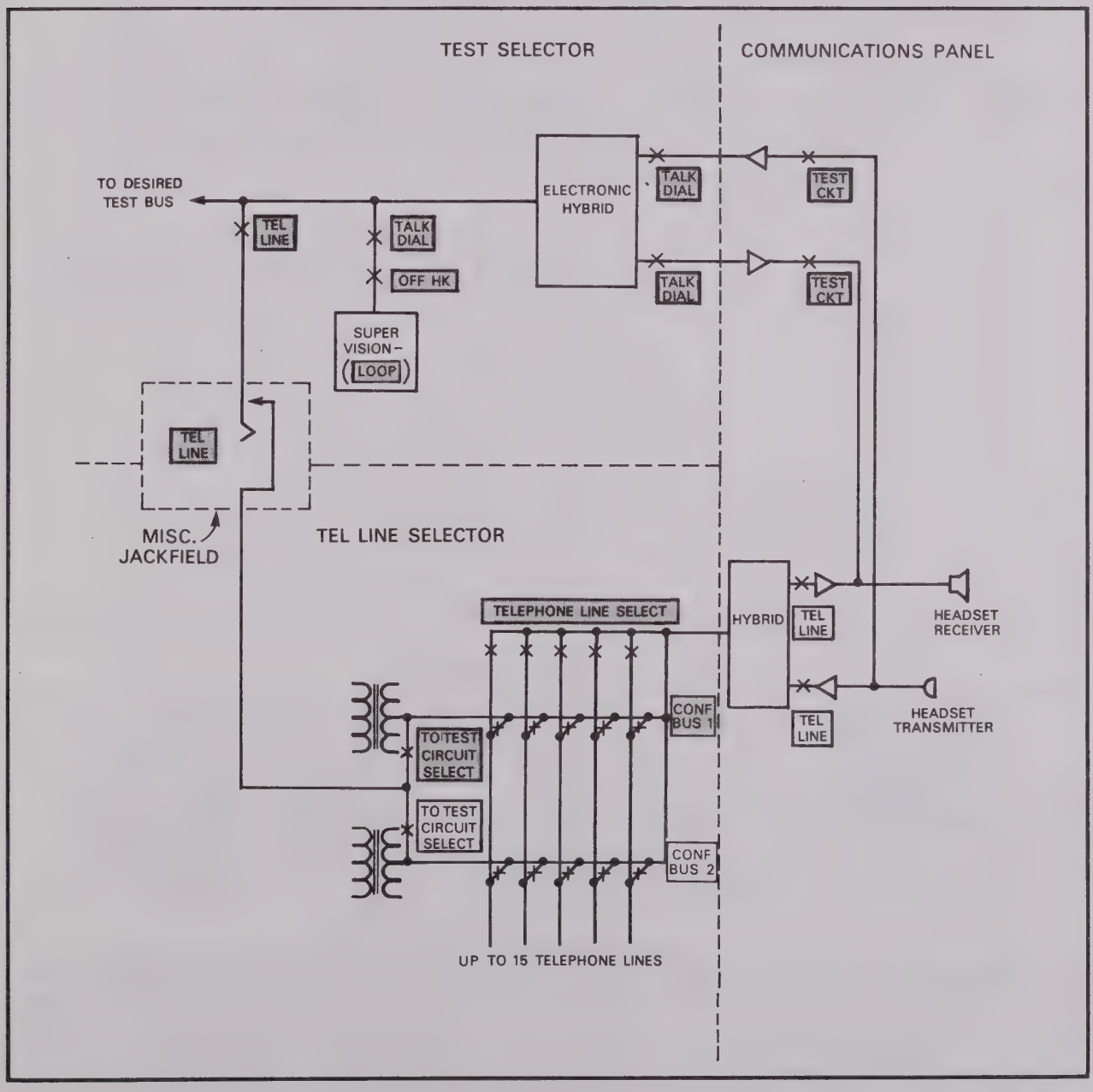
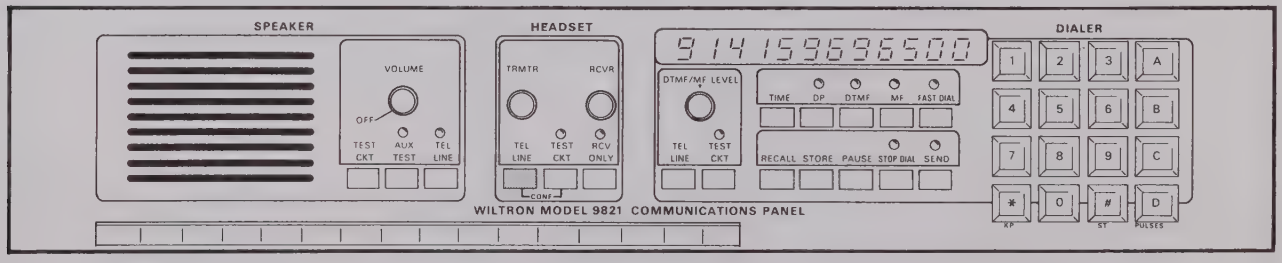


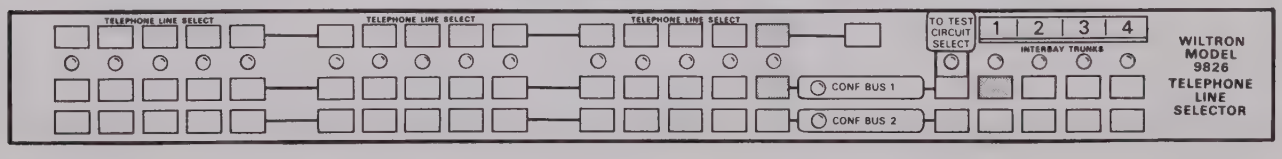
Table 3-6. Interbay Trunk Operation

STEP	PROCEDURE
1	To signal the test board from an interbay trunk: a. Send an off-hook signal from the interbay trunk at the far end to ring the test board. b. Talk when the test board operator answers the interbay trunk.
2	To receive an interbay trunk call at the test board: a. On Communications Panel, operate **HEADSET TEL LINE.** b. On Tel Line Selector Panel: (1) Operate the **INTERBAY TRUNK** button whose indicator is flashing at 60 ipm on an unused **CONF BUS.** (2) Locate and operate an unused **TELEPHONE LINE SELECT** button. (3) Depending upon which **CONF BUS** was selected in step (1), operate the **CONF BUS 1** or **CONF BUS 2** button that is directly below the **TELEPHONE LINE SELECT** operated in step (2). (4) Talk to the caller.

9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

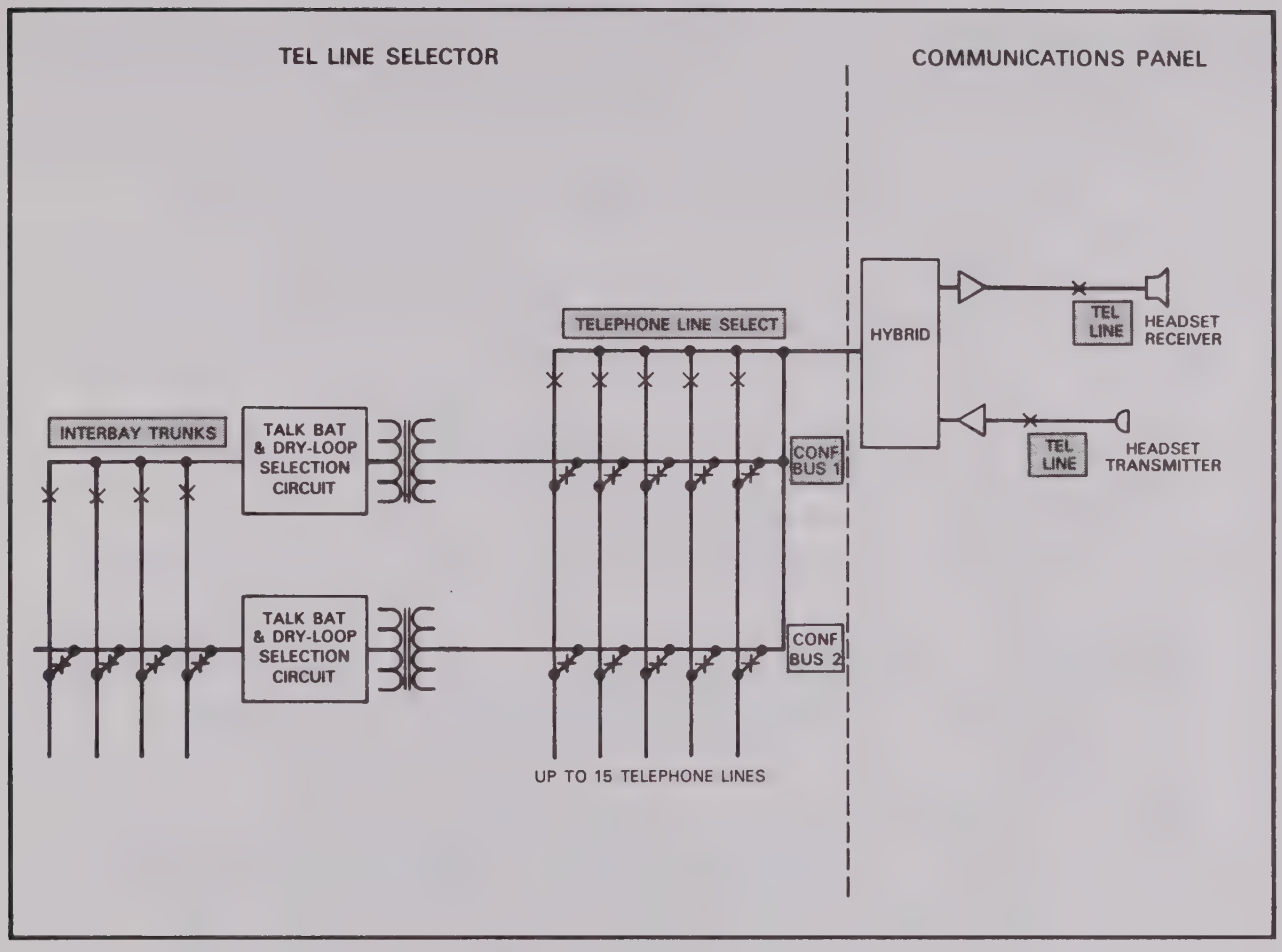
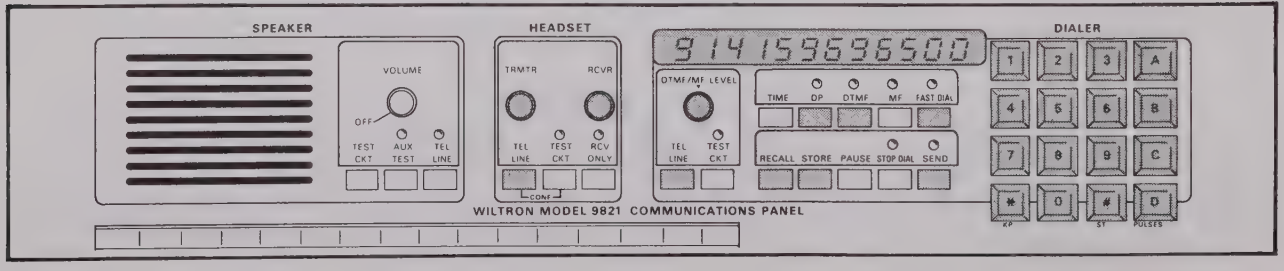


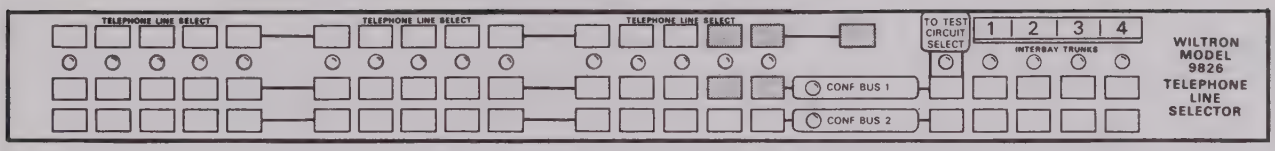
Table 3-7. Conferencing a Telephone Call

STEP	PROCEDURE
1	To conference a call that includes the test board operator: a. On Tel Line Selector Panel: (1) Operate a **TELEPHONE LINE SELECT** button to receive or place a call. Refer to step 1 of Table 3-4 to place a call or step 2 of Table 3-4 to receive a call. (2) Operate **HOLD** to hold the first call. The **TELEPHONE LINE SELECT** LED flashes at 120 ipm to indicate the hold sequence has begun. (3) Release the **TELEPHONE LINE SELECT** button operated in step (1) to place that line on hold. (4) Locate and operate an unused **TELEPHONE LINE SELECT**. Then dial the number of the party on the keypad of the 9820A/9821. For automatic out-dialing, refer to Table 3-3. (5) Reselect the **TELEPHONE LINE SELECT** from step (1). b. Observe that a conference call exists between the two parties and the test board operator.
2	To conference a call without including the test board operator: a. On Tel Line Selector Panel: (1) Operate a **TELEPHONE LINE SELECT** button to receive or place a call. Refer to step 1 of Table 3-4 to place a call or step 2 to receive a call. (2) Depending upon which **CONF BUS** is unused, operate the **CONF BUS 1** or **CONF BUS 2** button that is directly below the **TELEPHONE LINE SELECT** button operated in step (1) to hold the call. (3) Locate and operate an unused **TELEPHONE LINE SELECT** button. Then dial the number of the party on the keypad of the 9820A/9821. For automatic out-dialng, refer to Table 3-3. (4) When the party answers, operate the **CONF BUS** button that is directly below the **TELEPHONE LINE SELECT** operated in step (3) on the same **CONF BUS** selected in step (2). A conference çall now exists between the two parties and the test board operator. (5) To remove the test board operator from the conference call, release the two **TELEPHONE LINE SELECT** buttons. However, the two parties are still in a conference mode. b. Use the other **CONF BUS**, or perform other tests.

9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

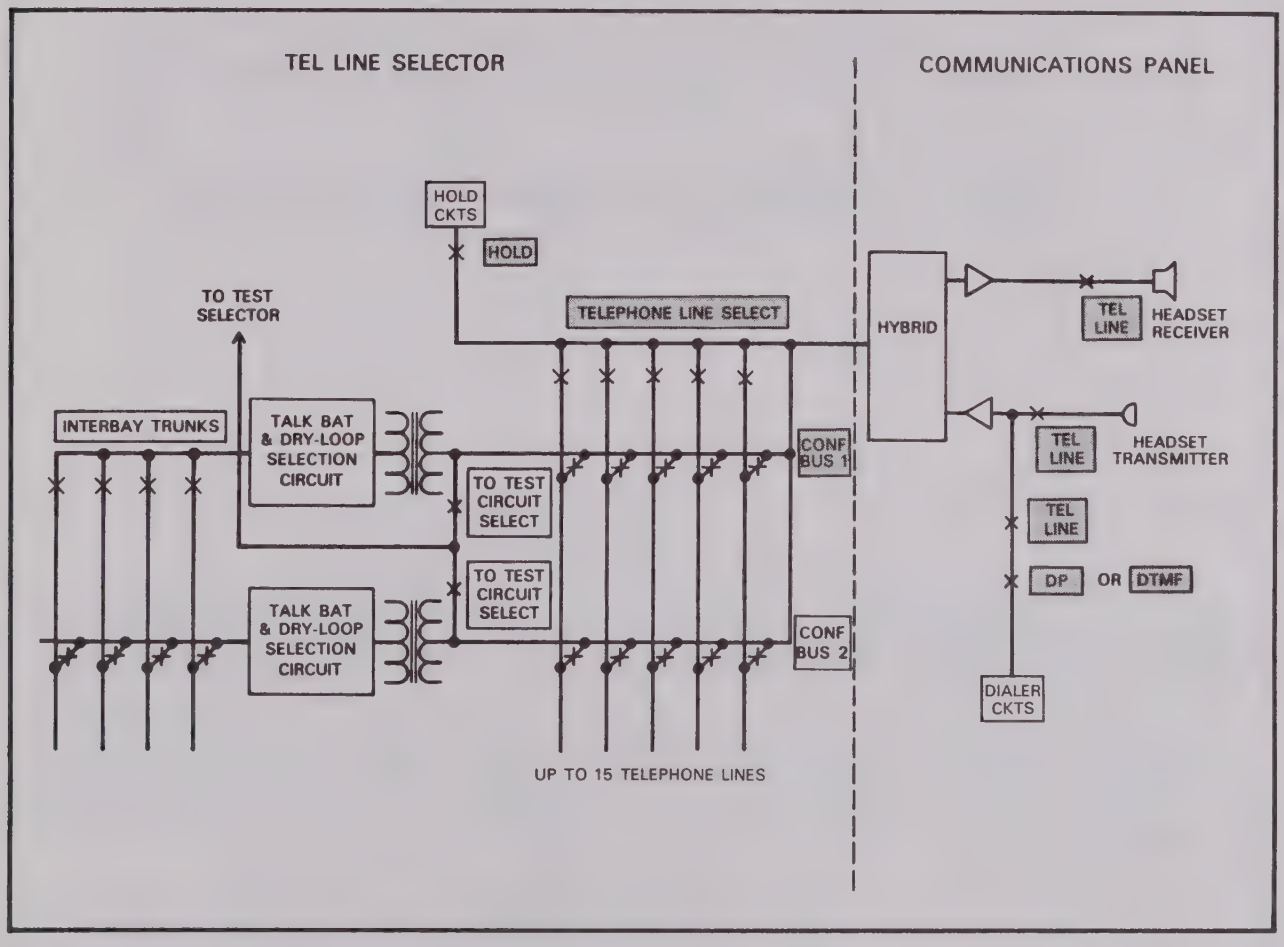
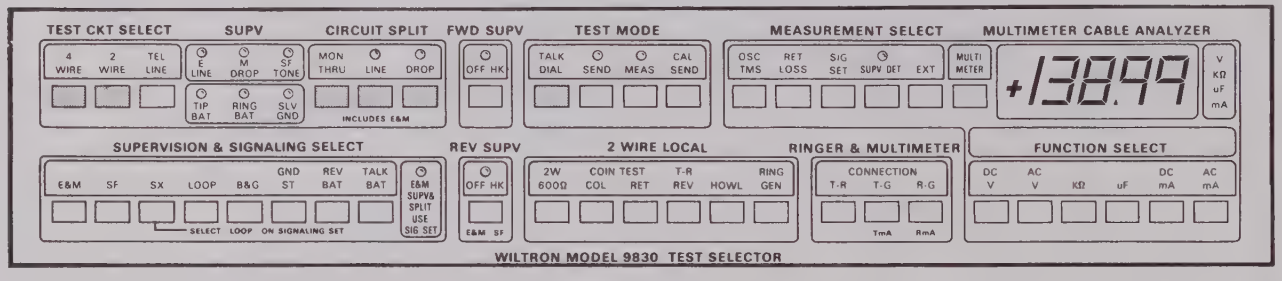


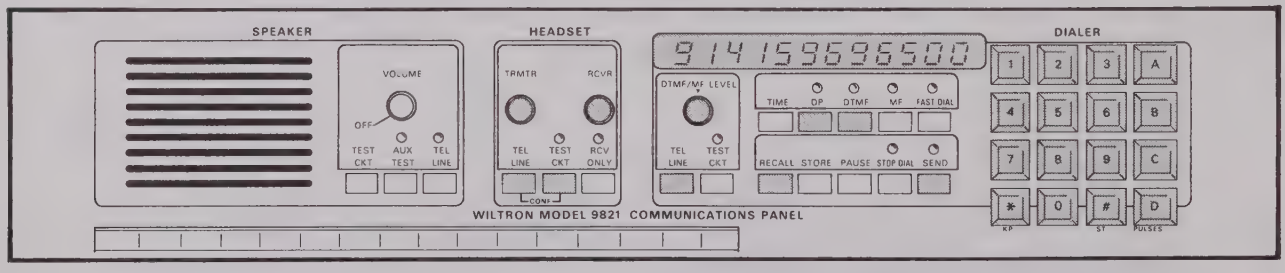
Table 3-8. Conferencing a Telephone Line to the Test Circuit

STEP	PROCEDURE
1	Place a call by performing step 1 of Table 3-4, or receive a call by performing step 2 of Table 3-4.
2	When the party is on the line: a. On 9830: (1) Operate **2 WIRE** or **4 WIRE**, as required by the test circuit. (2) Operate **MON THRU** to monitor, or **LINE** or **DROP** to split to the test circuit. (3) Operate **TALK DIAL**. b. On 9820A or 9821, simultaneously operate **HEADSET TEL LINE** and **TEST CKT** buttons to conference the telephone line to the test circuit.

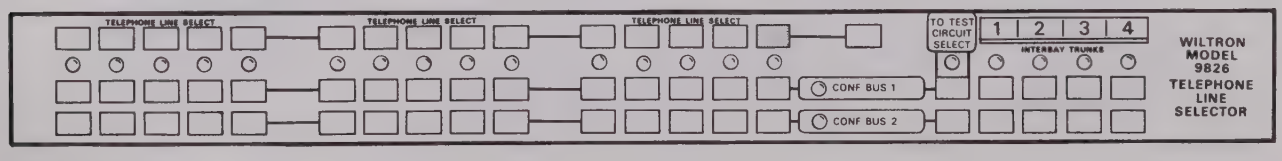
9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

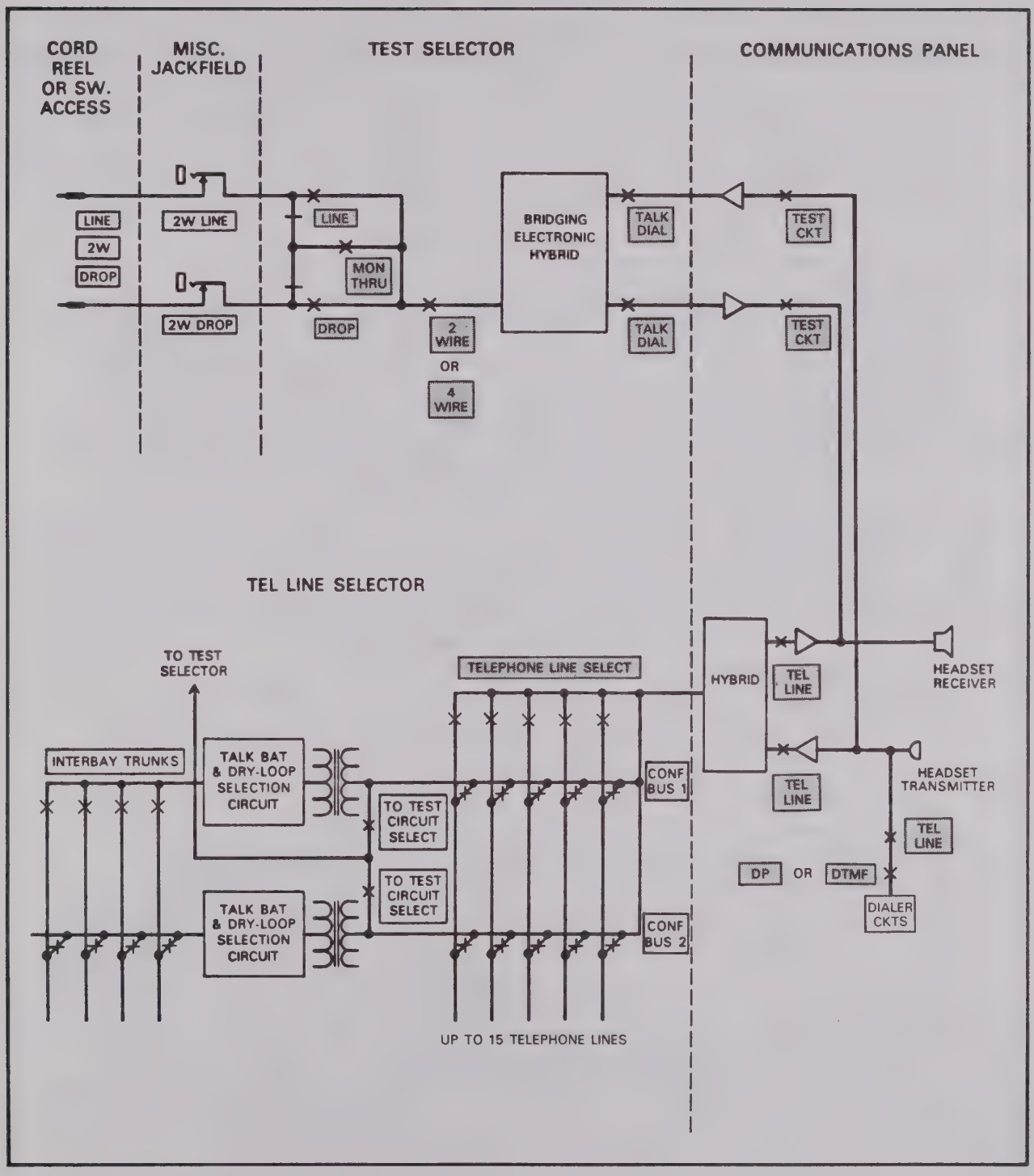
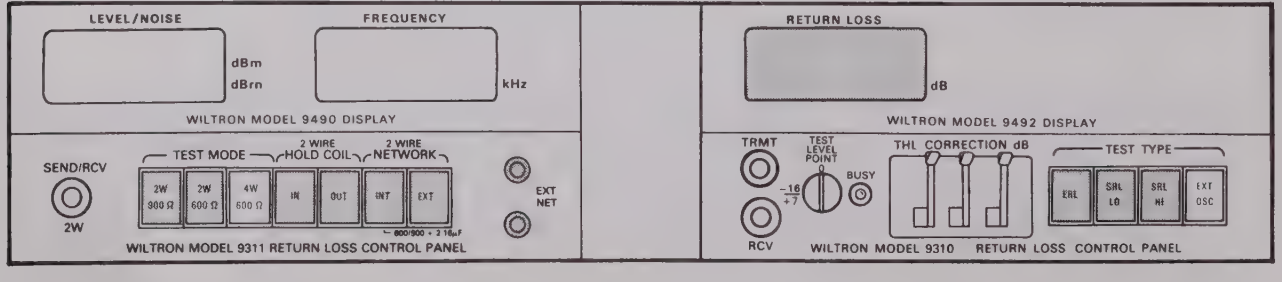


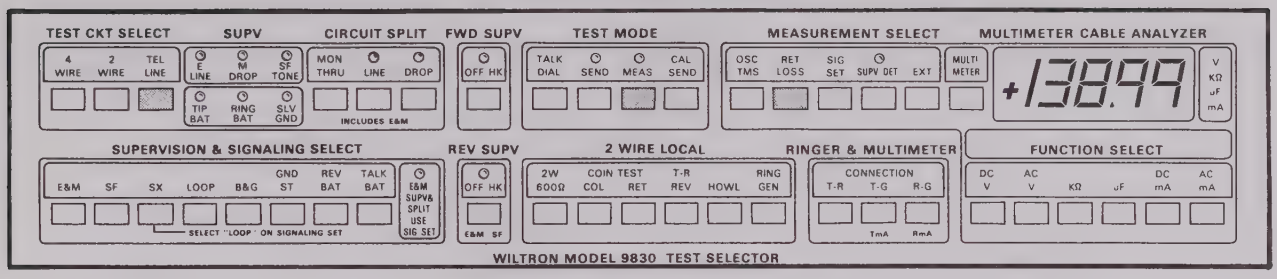
Table 3-9. Return Loss Measurements on a Telephone Line

STEP	PROCEDURE
	NOTE If an external return loss test set is used, connect it to the **RET LOSS 2W** jack on the 9865 jackfield.
1	On Test Selector Panel: a. Operate **TEL LINE.** b. Operate **MEAS.** c. Operate **RET LOSS.**
2	On 9311 Return Loss Control Panel: a. For 600-ohm impedance, operate **2W 600Ω.** For 900-ohm impedance, operate **2W 900Ω.** b. To hold the circuit under test, operate **2 WIRE HOLD COIL IN;** otherwise, operate **2 WIRE HOLD COIL OUT.** c. For a 600- or 900-ohm, 2.16 μF compromise 2-wire network, operate **2 WIRE NETWORK INT.** For precision balance network (PBN) measurements, connect PBN to **EXT NET** jacks and operate **2 WIRE NETWORK EXT.** If 9315 Decade Capacitor is installed, set it to the office NBO value.
3	On Tel Line Selector Panel: a. To place or receive a call and then perform measurements on it, refer to step 1 or 2 of Table 3-4, then refer to Table 3-5. b. Release the operated **TELEPHONE LINE SELECT** button to prevent double-termination condition from affecting a measurement.
4	On Communicatons Panel: a. Press **DP** or **DTMF**, as required by the circuit. b. Dial the code on the keypad for a balanced termination. For automatic dialing, refer to Table 3-3.
5	On 9310 Return Loss Control Panel: a. Operate **ERL.** Note echo return loss reading on display. b. Operate **SRL-LO.** Note reading on display. c. Operate **SRL-HI.** Note reading on display. d. Compare the readings in steps 5b and c. The lower reading is the singing point of the circuit.

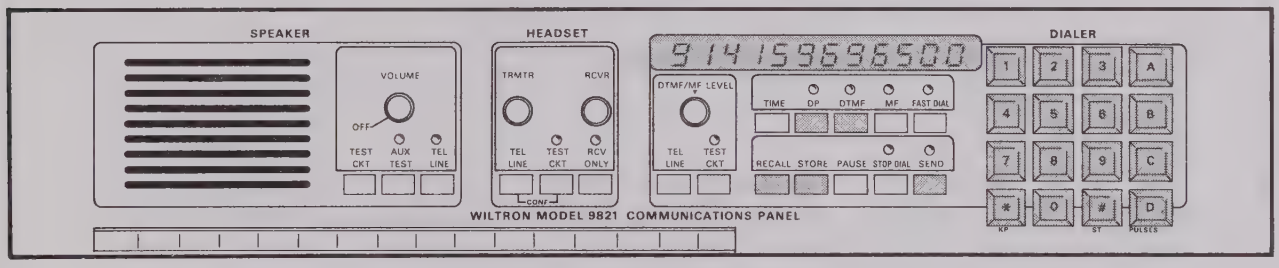
9102A-TB DEDICATED TRANSMISSION MEASUREMENT SYSTEM



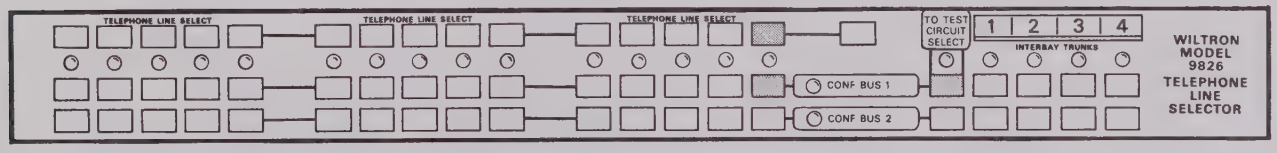
9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



9826 TEL LINE SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM

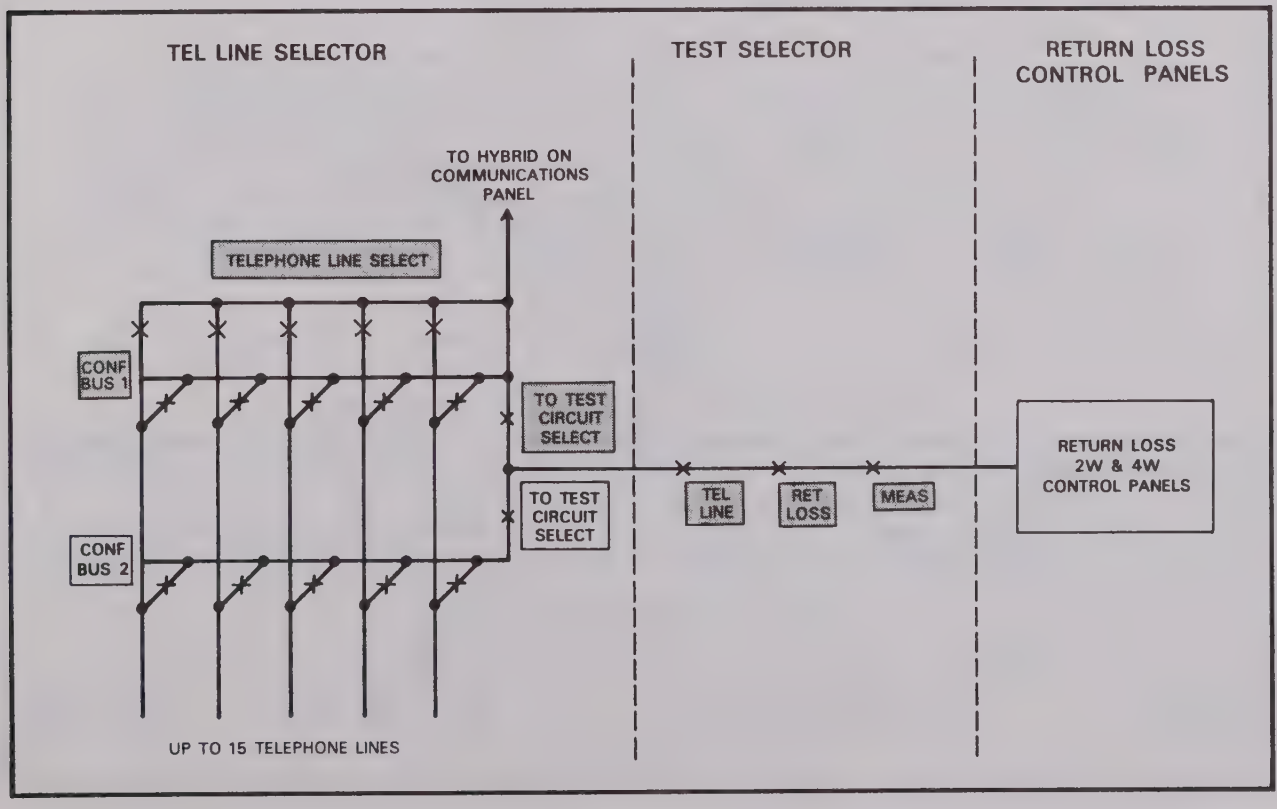
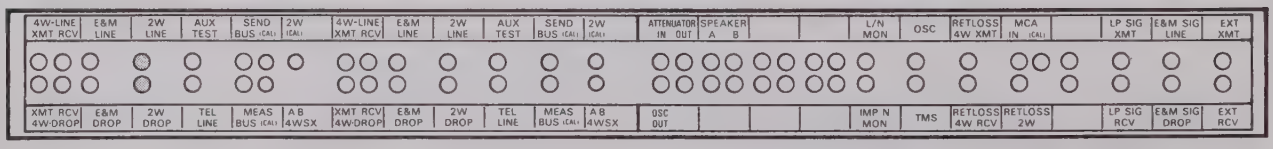


Table 3-10. Two-Wire Loop or B&G, Split to Line or Drop

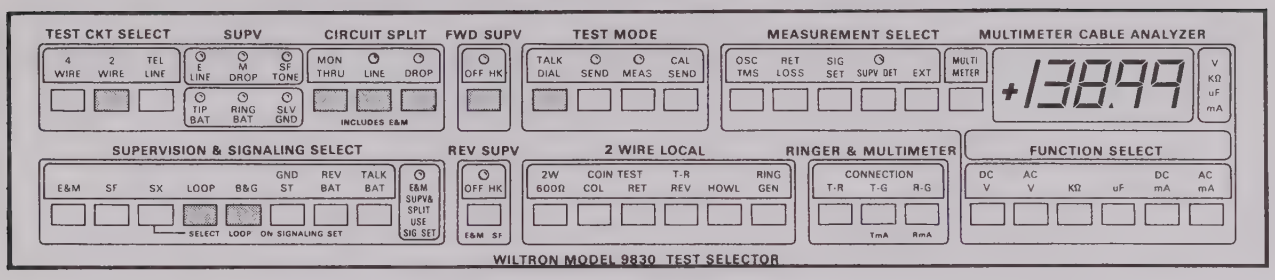
STEP	PROCEDURE
	NOTE For testing loop/B&G on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU**. b. Operate **2 WIRE**. c. Operate **TALK DIAL**. d. Operate **LOOP** or **B&G**, depending upon which circuit is under test. e. Operate **FWD SUPV OFF HK**.
2	On Communications Panel: a. Press **DP** or **DTMF** for desired dialing mode. b. Press **DIALER TEST CKT**, and press **STOP DIAL** to disable stop-dial function (lamp goes out). c. Operate **HEADSET TEST CKT**. d. For fast dialing, press **FAST DIAL**. NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmisster is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. e. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels.
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
4	On Test Selector Panel, operate **LINE** or **DROP** to split to the desired direction.
5	On Communications Panel, dial desired number on keypad to talk to 2-wire line or drop. For automatic out-dialing, refer to Table 3-3.
6	On Test Selector Panel, **RING BAT** or **TIP BAT** LED will light for answer supervision.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

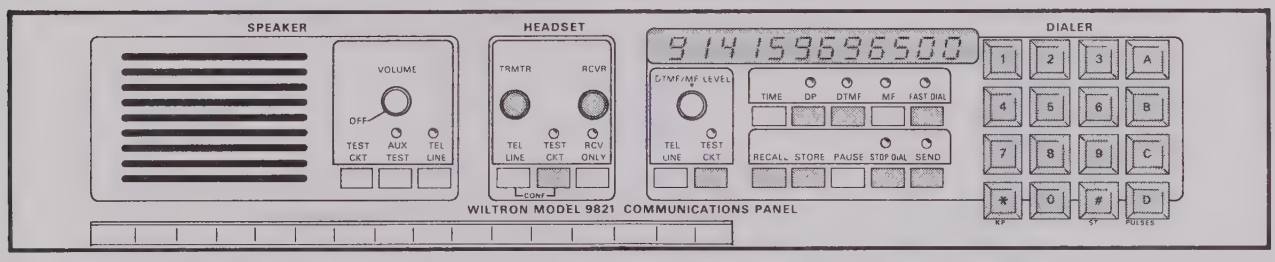


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

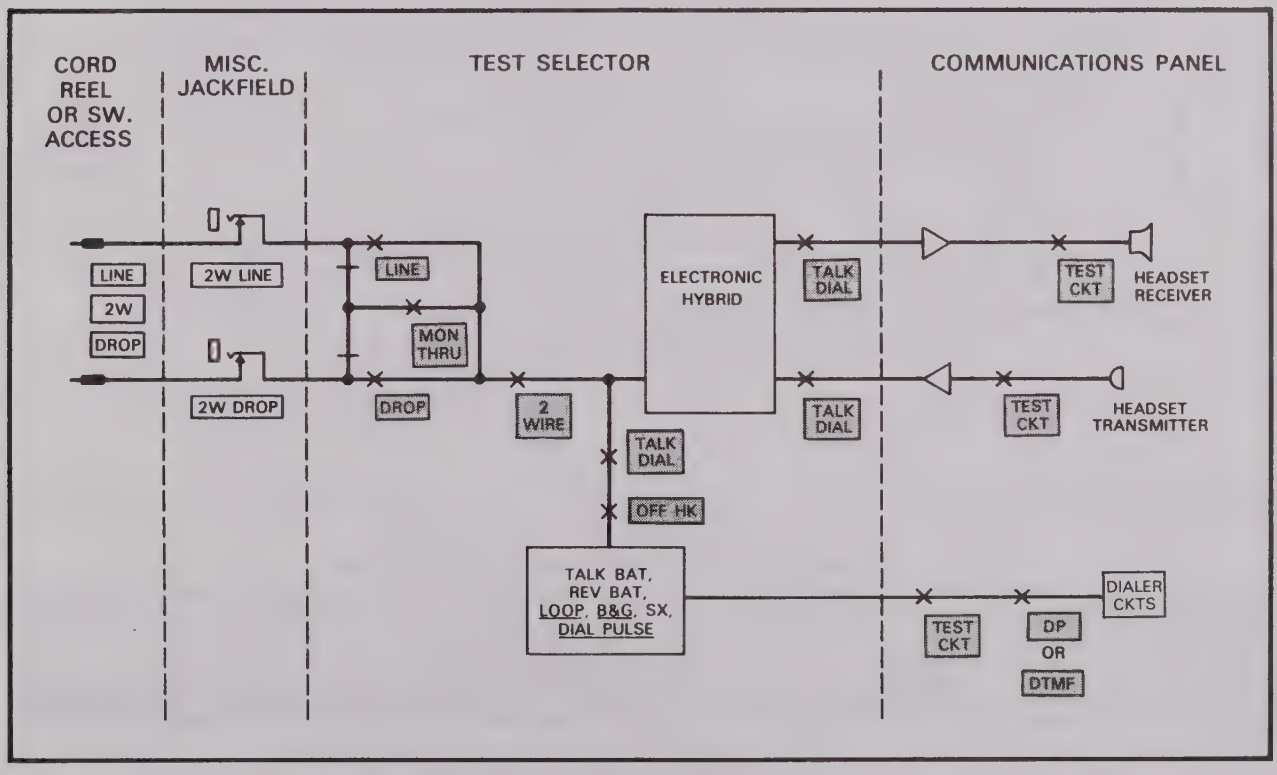
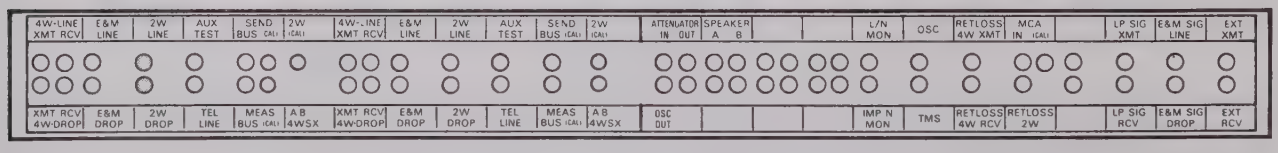


Table 3-11. Two-Wire SX Talk/Dial, Split to Line or Drop

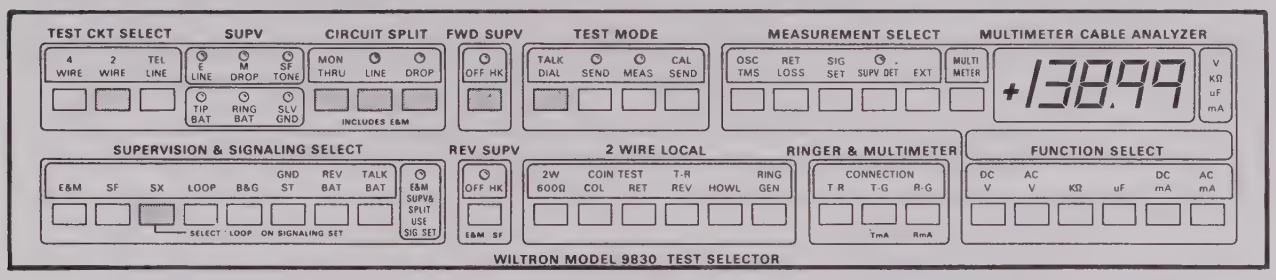
STEP	PROCEDURE
1	On Test Selector Panel: a. Operate **MON THRU.** b. Operate **2 WIRE.** c. Operate **SX.** d. Operate **TALK DIAL.** e. Operate **FWD SUPV OFF HK.** f. Release **SIG SET** button, if operated.
2	On Communications Panel: a. Press **DP** and **DIALER TEST CKT.** For fast dialing, press **FAST DIAL.** (Lamp will light.) b. Operate **HEADSET TEST CKT.** NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. c. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels.
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
4	On Test Selector Panel: a. Operate **LINE** or **DROP** to split to the desired direction. b. **SLV GND** LED lights for answer supervision. NOTE A center-tapped retard coil is common to tip and ring leads to provide a simplex point for ground seizure.
5	On Communications Panel, dial desired number on keypad to talk to 2-wire SX line or drop. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

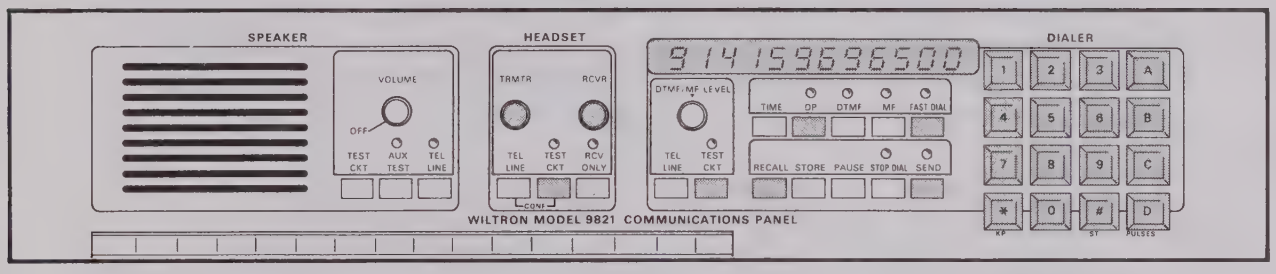


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

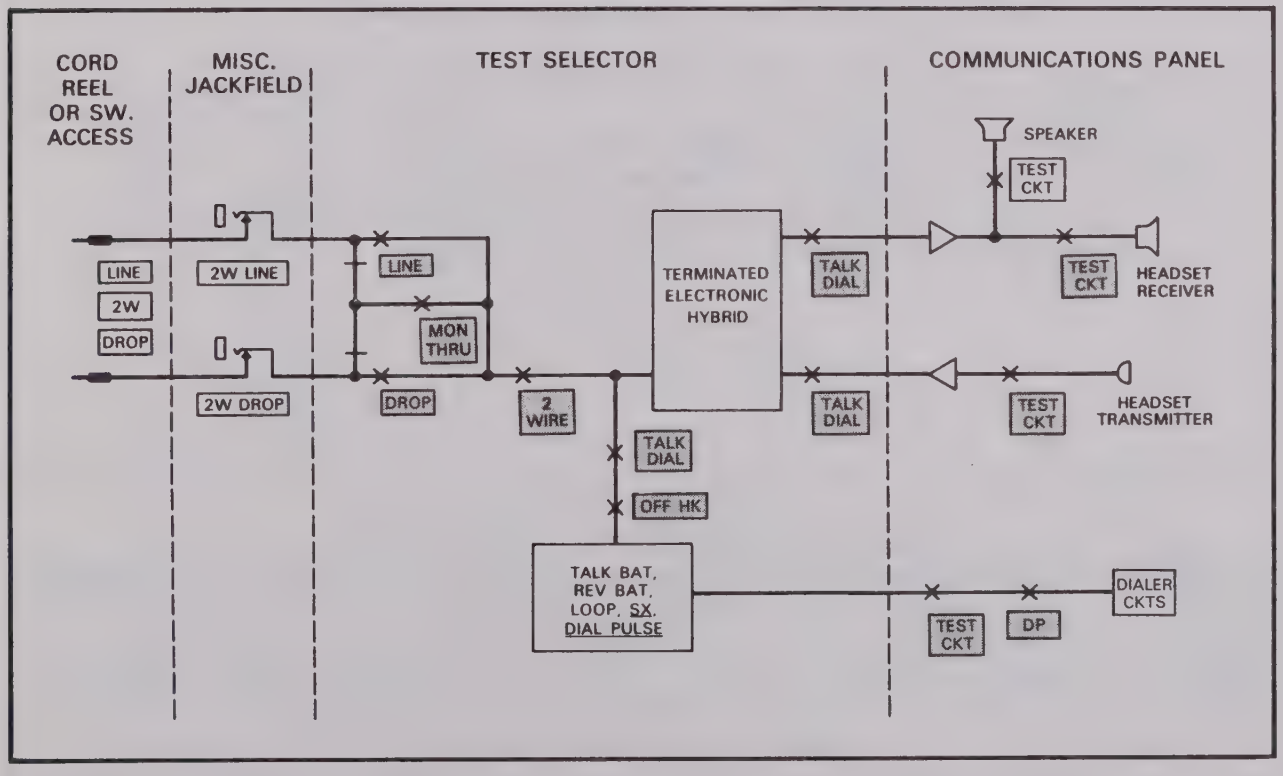
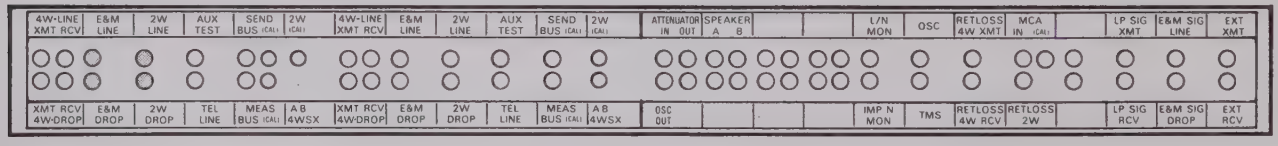


Table 3-12. Two-Wire E&M Talk/Dial, Split to Line or Drop

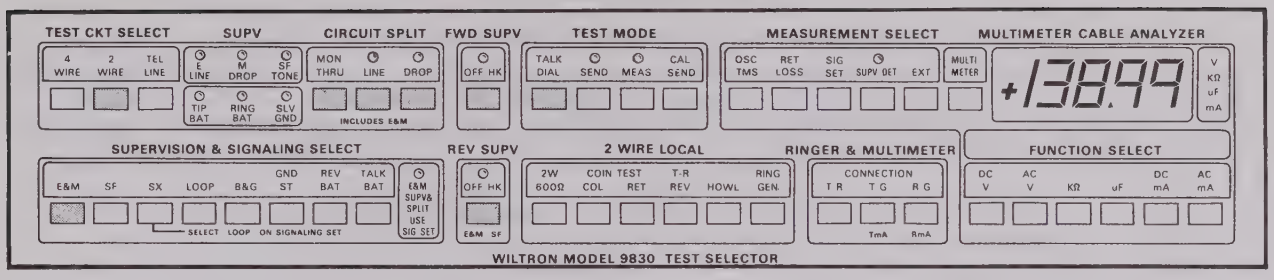
STEP	PROCEDURE
	NOTE For testing E&M talk/dial on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU**. b. Operate **2 WIRE**. c. Operate **E&M**. d. Operate **TALK DIAL**. e. Operate **FWD SUPV OFF HK** and **REV SUPV OFF HK**.
2	On Communications Panel: a. Operate **HEADSET TEST CKT** and **DIALER TEST CKT**. Also press **STOP DIAL** to disable stop-dial function (lamp goes out). NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. c. Press **DP**. For fast dialing, also press **FAST DIAL** (lamp is lit).
3	Simultaneously access line, drop, and E&M of circuit under test to cord reel, jackfield, or switched access. **E LINE** and **M DROP** LED's are lit when circuit under test is idle.
4	On Test Selector Panel, operate **LINE** or **DROP** to split to desired direction. **E&M SUPV & SPLIT** LED will indicate supervision state.
5	On Communications Panel, dial desired number on keypad to talk to 2-wire line or drop. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

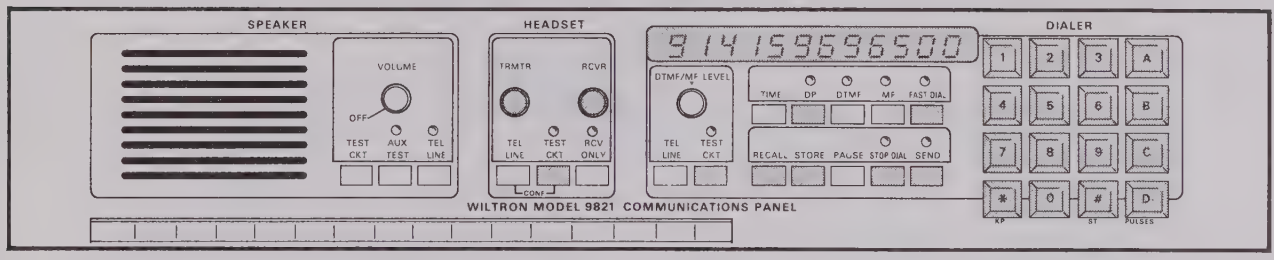


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

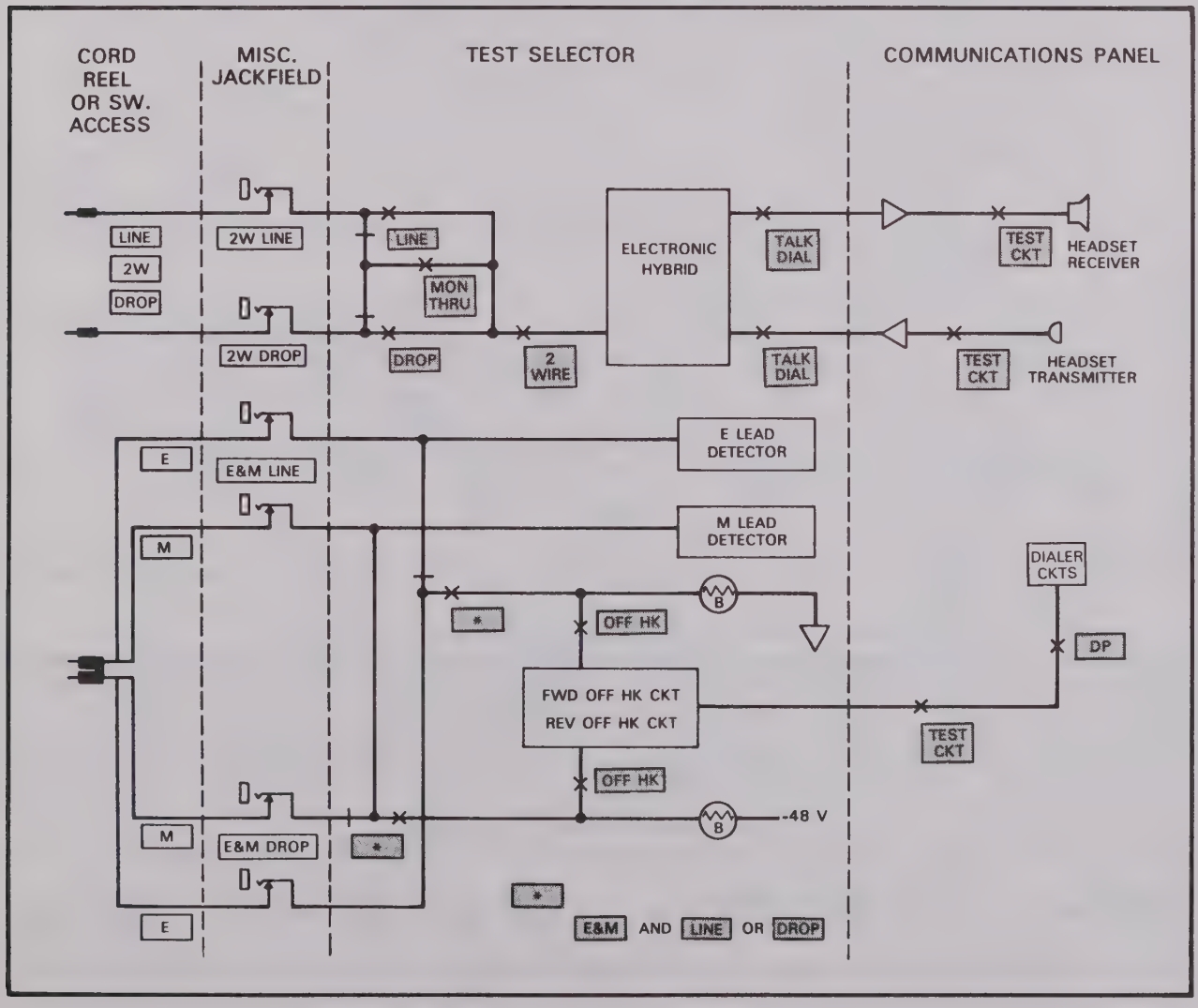
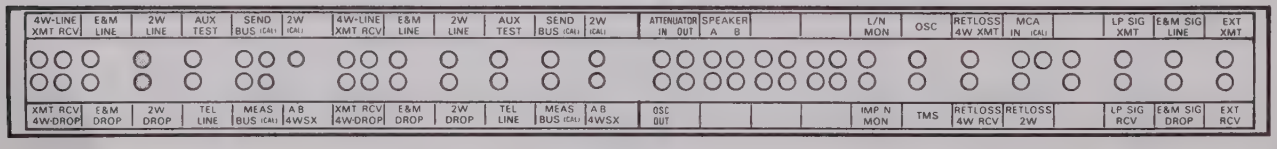


Table 3-13. Two-Wire MF or DTMF Talk/Dial, Split to Line or Drop

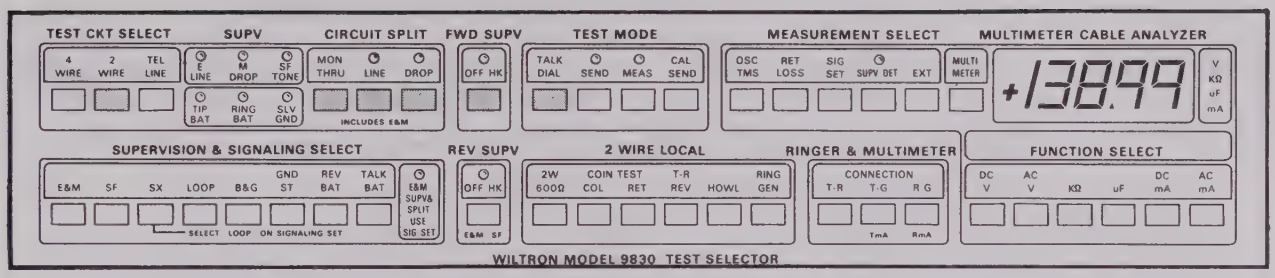
STEP	PROCEDURE
	NOTE For testing MF or DTMF talk/dial on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Communications Panel: a. Operate **HEADSET TEST CKT.** NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. c. Press **DIALER TEST CKT.** Also, press **STOP DIAL** to disable stop-dial function (lamp goes out). d. Press **DIALER MF** or **DTMF** for desired dialing mode. e. To change dialer output level, adjust **DTMF & MF LEVEL.**
2	On Test Selector Panel: a. Operate **MON THRU.** b. Operate **2 WIRE.** c. Operate **TALK DIAL.** d. To select required supervision for circuit under test, operate appropriate **SIGNALING SELECT** button. e. Operate **FWD SUPV OFF HK.**
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
4	On Test Selector Panel, operate **LINE** or **DROP** to split to the desired direction.
5	On Communications Panel, dial desired number on keypad according to local practices. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

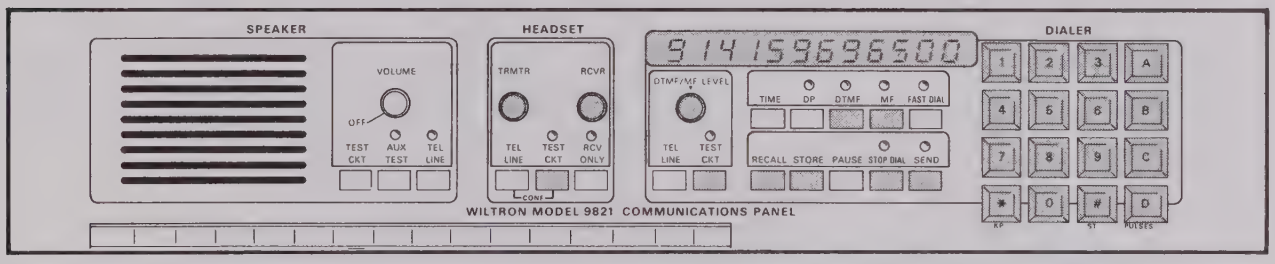


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

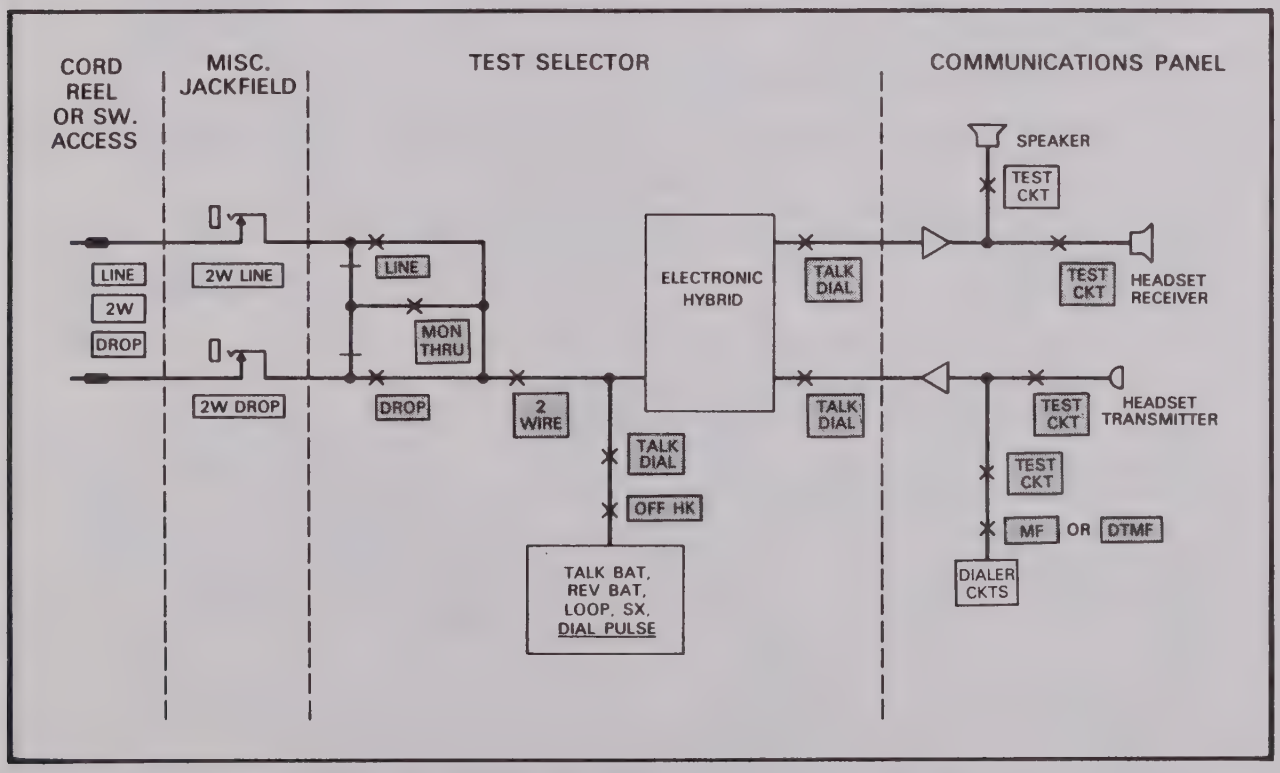
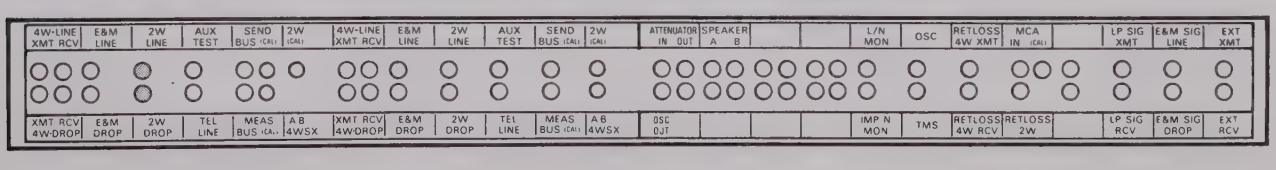


Table 3-14. Two-Wire Ground-Start

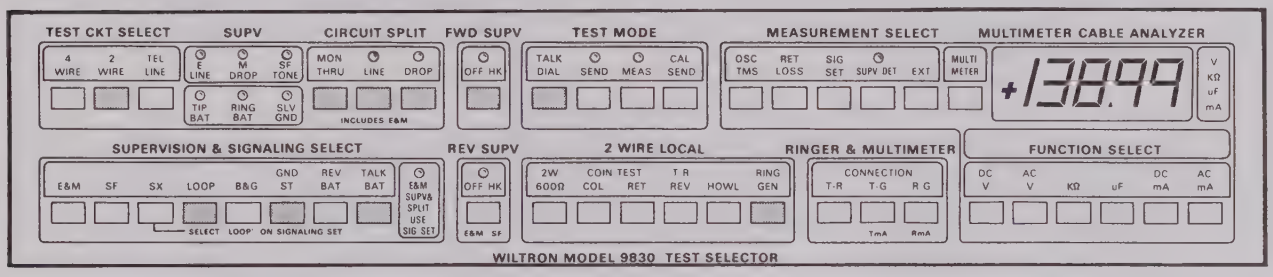
STEP	PROCEDURE
	NOTE For testing ground-start on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Communications Panel: a. Press **DP**. For fast dialing, also press **FAST DIAL** (lamp is lit). b. Press **DIALER TEST CKT**. Also, press **STOP DIAL** to disable stop-dial function (lamp goes out). c. Operate **HEADSET TEST CKT**. NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. d. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels.
2	On Test Selector Panel: a. Operate **MON THRU**. b. Operate **2 WIRE**. c. Operate **TALK DIAL**. d. Operate **LOOP**. e. Operate **FWD SUPV OFF HK**.
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
4	On Test Selector Panel: a. Operate **LINE** or **DROP** to split to the desired direction. b. Operate and hold **GND ST** when split to the line; release it when dial tone is heard. c. When split to the drop: (1) Operate **TALK BAT**. (2) Operate **RING GEN** to ring the PBX line. NOTE **RING BAT** or **TIP BAT** LED lights to indicate answer supervision.
5	On Communications Panel, dial desired number on keypad. For automatic dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

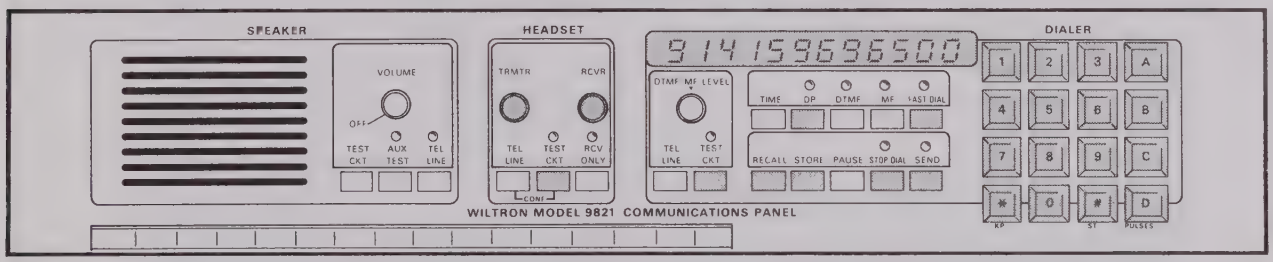


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

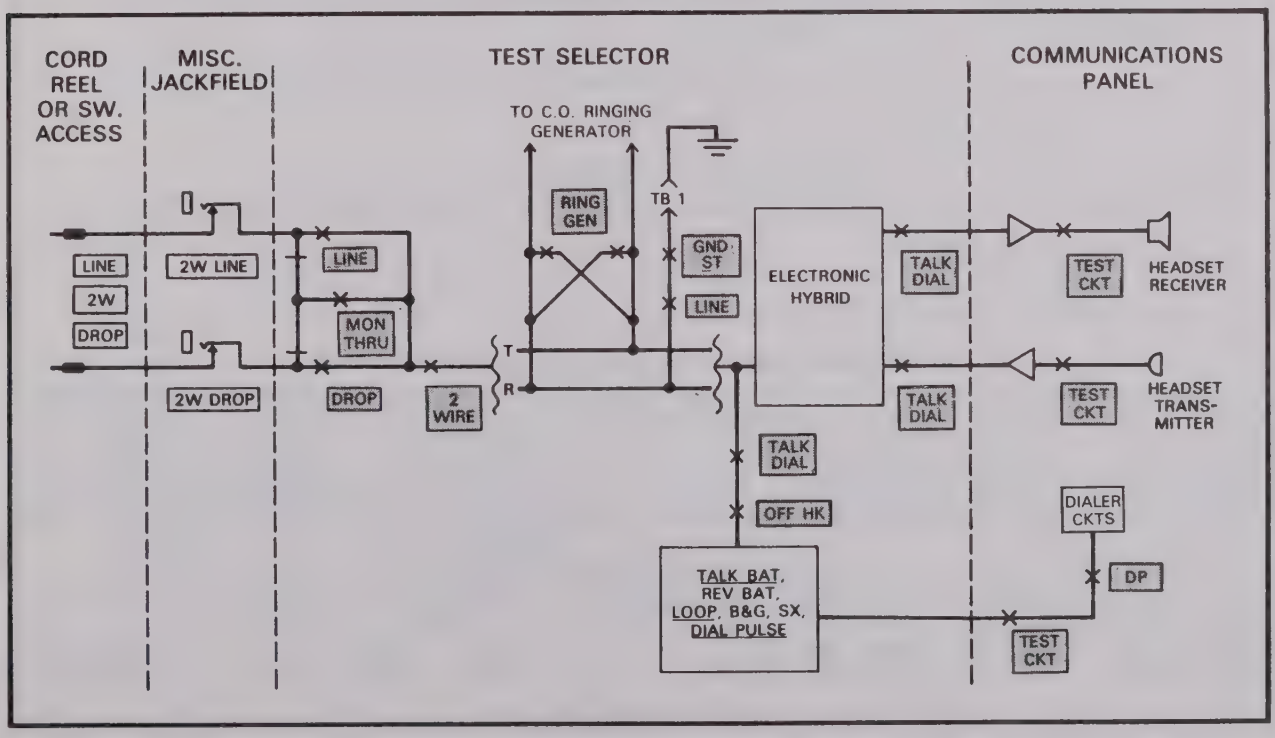
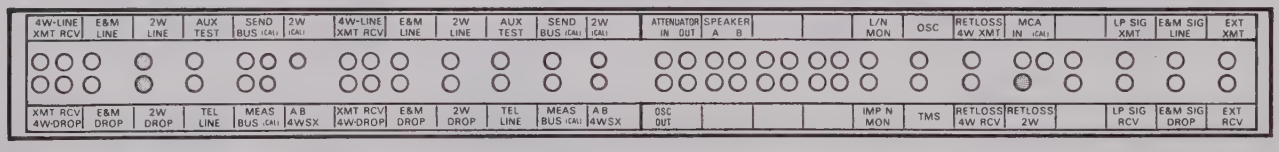


Table 3-15. Two-Wire Return Loss Measurements

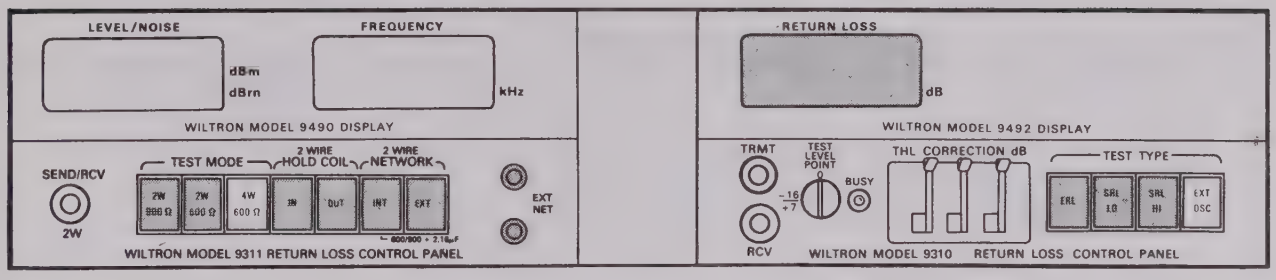
STEP	PROCEDURE
	NOTE If an external return loss test set is used, connect it to the **RET LOSS 2W** jack on the 9865 jackfield.
1	On Test Selector Panel: a. Operate **MON THRU**. b. Operate **2 WIRE**. c. Operate **MEAS**. d. Operate **RET LOSS**.
2	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access.
3	On Test Selector Panel, operate **LINE** or **DROP** to split to the desired direction.
4	On Communications Panel: a. Press **DP** or **DTMF**, as required by the circuit. b. Dial the code on the keypad for a balanced termination. For automatic out-dialing, refer to Table 3-3.
5	On 9311 Return Loss Control Panel: a. For 600-ohm impedance, operate **2W 600Ω**. For 900-ohm impedance, operate **2W 900Ω**. b. To hold the circuit under test, operate **2 WIRE HOLD COIL IN**; otherwise, operate **2 WIRE HOLD COIL OUT**. c. For a 600- or 900-ohm, 2.16 μF compromise 2-wire network, operate **2 WIRE NETWORK INT**. For precision balance network (PBN) measurements, connect PBN to **EXT NET** jacks and operate **2 WIRE NETWORK EXT**. If 9315 Decade Capacitor is installed, set it to the office NBO value.
6	On 9310 Return Loss Control Panel: a. Operate **ERL**. Note echo return loss reading on display. b. Operate **SRL-LO**. Note reading on display. c. Operate **SRL-HI**. Note reading on display. d. Compare the readings in steps b and c. The lower reading is the singing point of the circuit.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

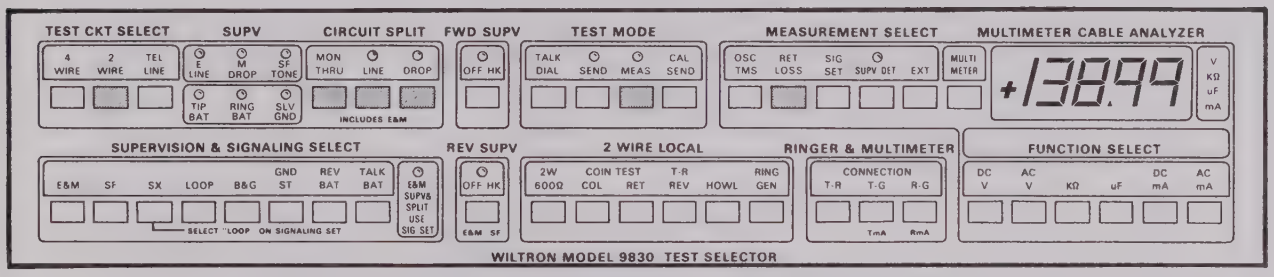


9860-MT CORD REEL PANEL (IF INSTALLED)

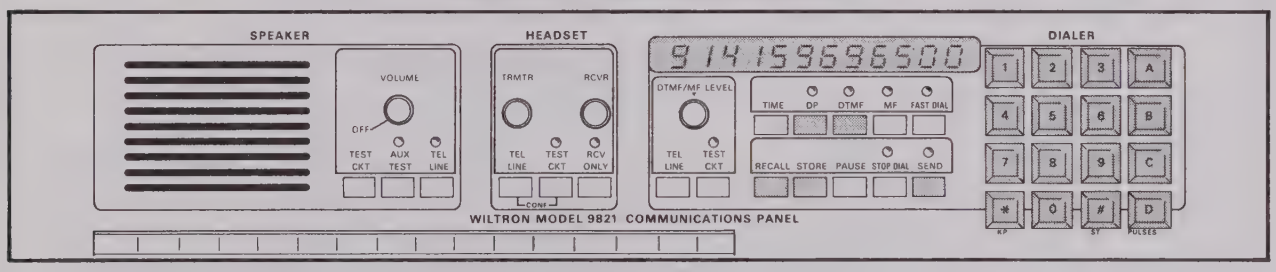
9102A-TB DEDICATED TRANSMISSION MEASUREMENT SYSTEM



9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

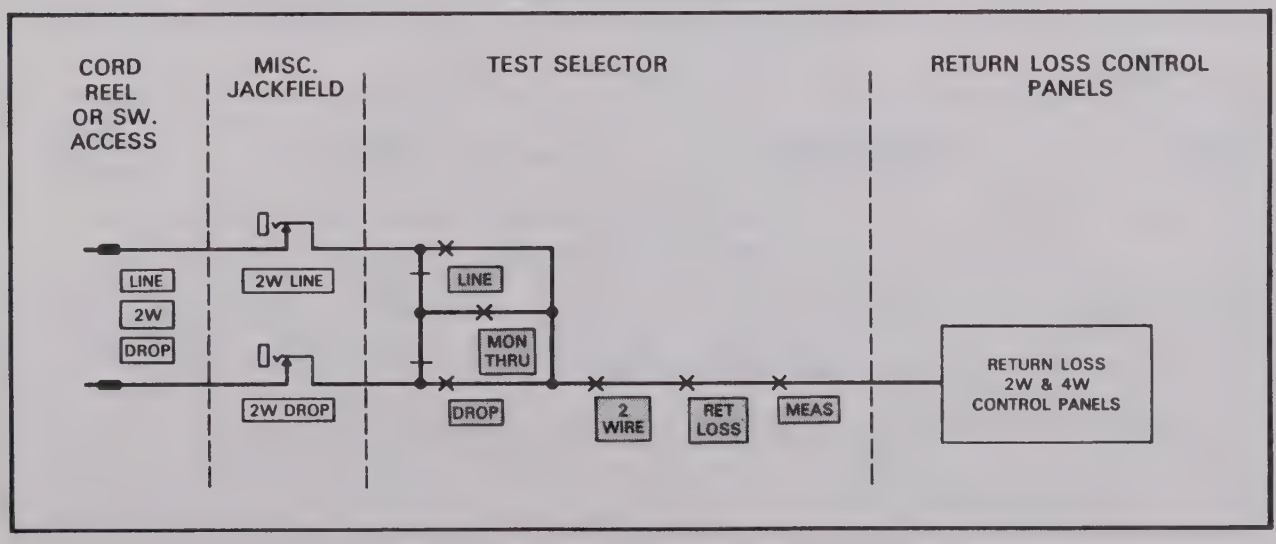
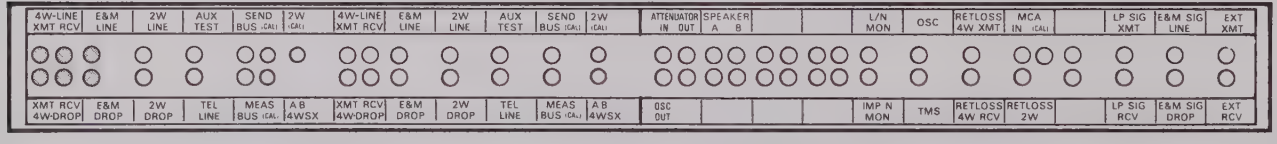


Table 3-16. Four-Wire E&M Talk/Dial, Split to Line or Drop

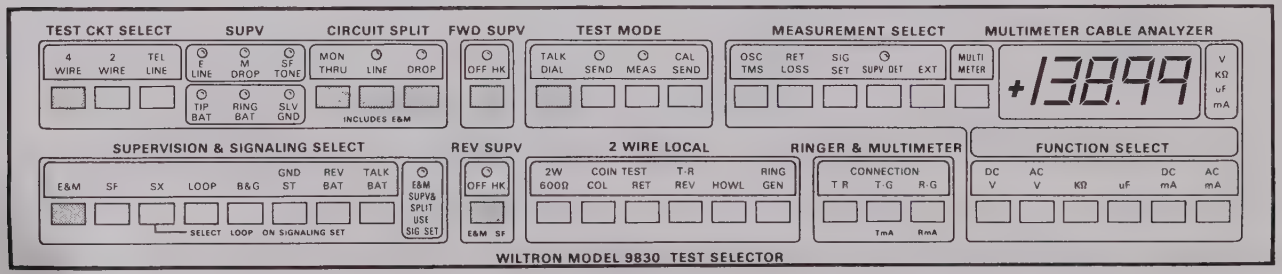
STEP	PROCEDURE
	NOTE For testing E&M talk/dial in stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU.** b. Operate **4 WIRE.** c. Operate **E&M.** d. Operate **TALK DIAL.**
2	Simultaneously access line, drop, and E&M of circuit under test to cord reel, jackfield, or switched access. **E LINE** and **M DROP** LED's are lit when circuit under test is idle.
3	On Test Selector Panel, operate **FWD SUPV OFF HK** and **REV SUPV OFF HK.** Also operate **LINE** or **DROP** to split to the desired direction.
4	On Communications Panel: a. Operate **HEADSET TEST CKT.** NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. c. Press **DIALER TEST CKT** and **DP.** Also press **STOP DIAL** to disable stop-dial function (lamp goes out). d. Dial desired number on keypad. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

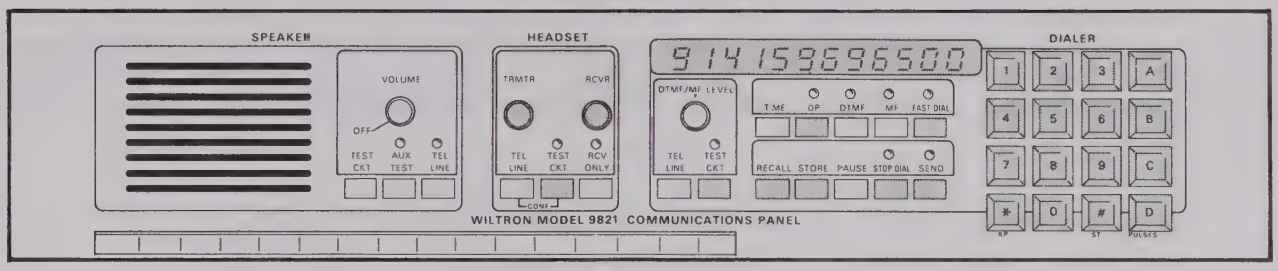


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

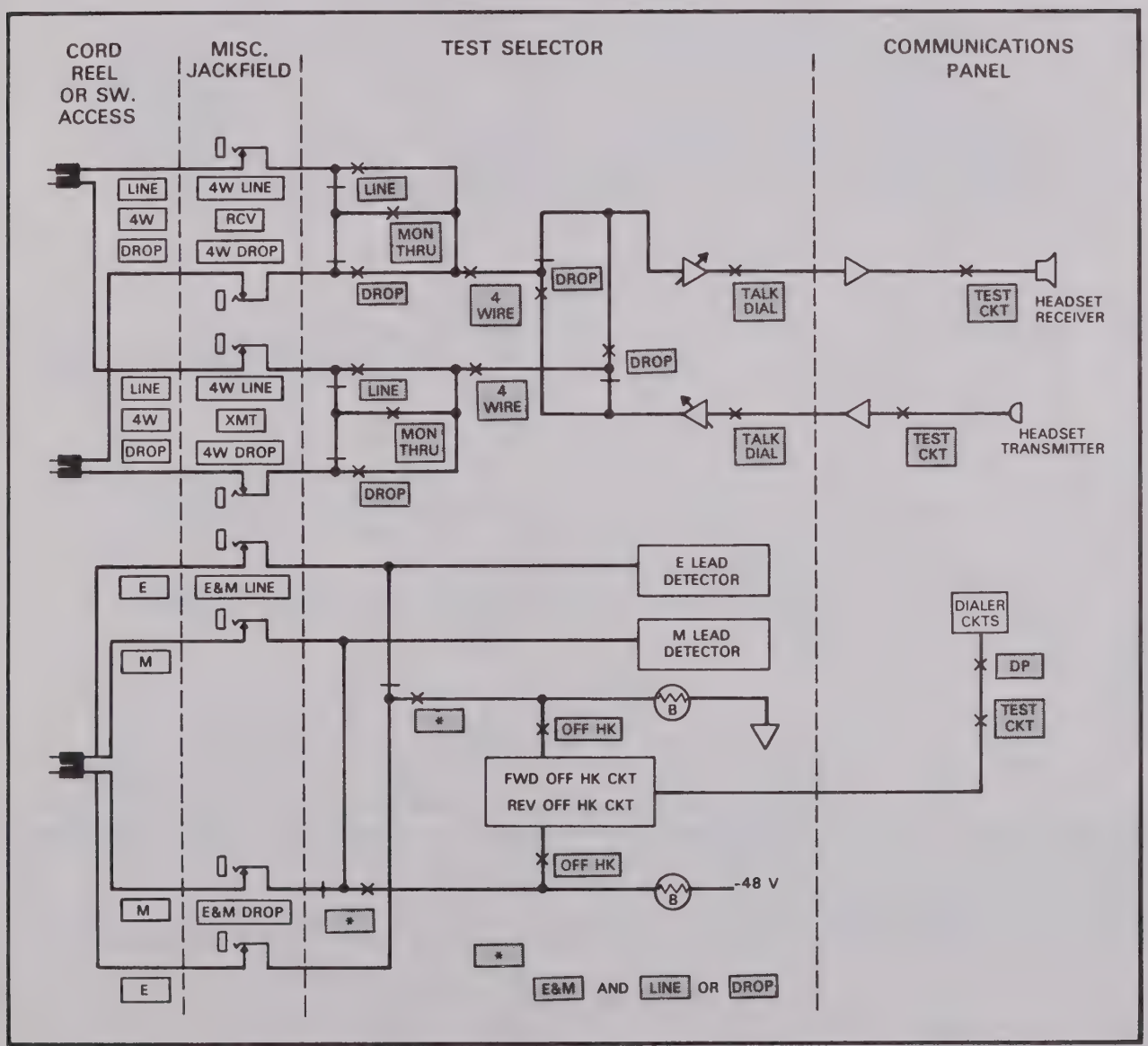
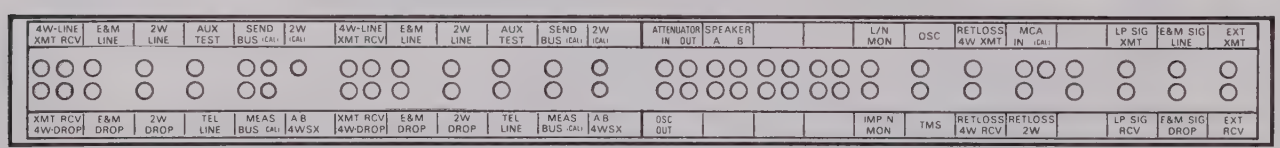


Table 3-17. Four-Wire SF Talk/Dial, Split to Line or Drop

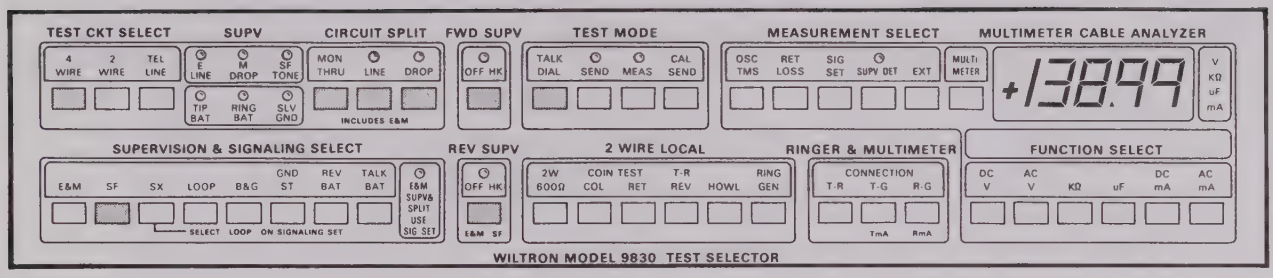
STEP	PROCEDURE
	NOTE For testing SF talk/dial on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU.** b. Operate **4 WIRE.** c. Operate **SF** button. **SF TONE** LED lights when circuit is on-hook. d. Operate **FWD SUPV OFF HK** and **REV SUPV OFF HK.** Also operate **TALK DIAL.**
2	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
3	On Test Selector Panel, operate **LINE** or **DROP** to split to the desired direction.
4	On Communications Panel: a. Operate **HEADSET TEST CKT.** NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels.
5	On Communications Panel: a. Press **DIALER TEST CKT** and **DP.** Also press **STOP DIAL** to disable stop-dial function (lamp goes out). b. For fast dialing, press **FAST DIAL** (lamp is lit). c. Dial desired number on keypad. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

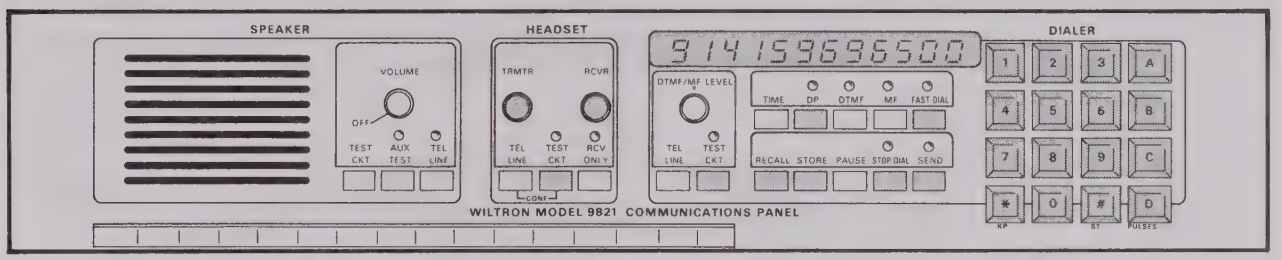


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

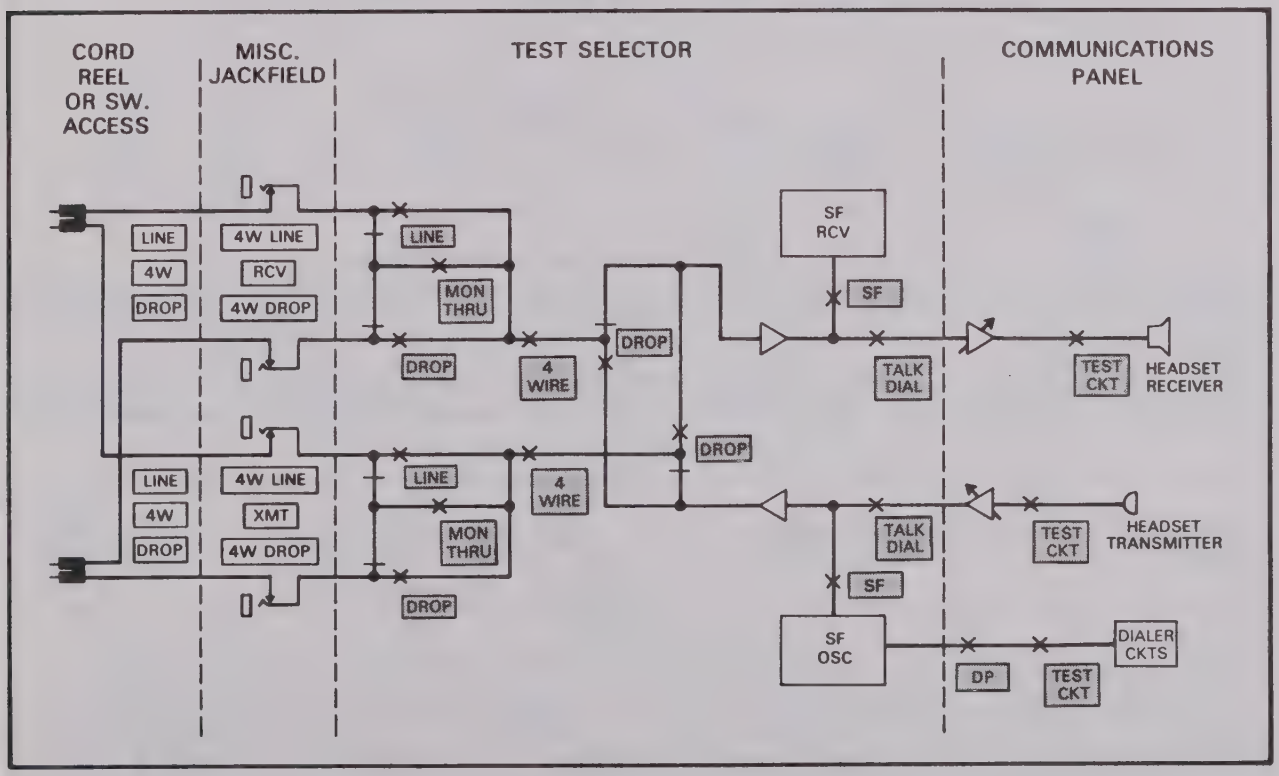
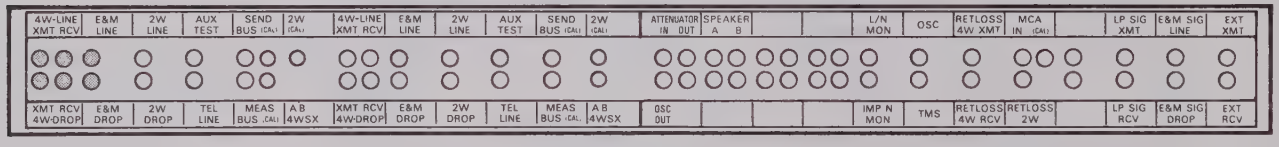


Table 3-18. Four-Wire MF or DTMF Talk/Dial to Line or Drop with E&M or SF Supervision

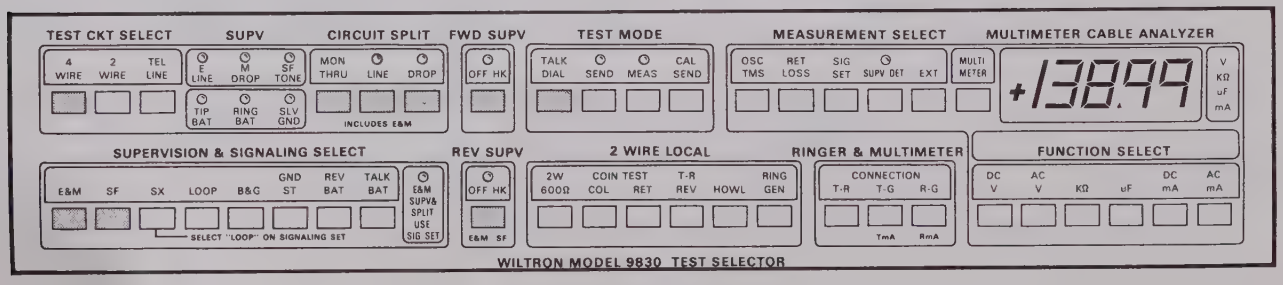
STEP	PROCEDURE
	NOTE For testing MF or DTMF talk/dial on stop-dial, wink-start, or delay dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU** and **4 WIRE.** b. Operate **E&M** or **SF**, as required by the circuit. **E&M SUPV & SPLIT** LED is lit when the circuit is idle. c. Operate **TALK DIAL.**
2	Simultaneously access line, drop, and E&M of circuit under test to cord reel, jackfield, or switched access.
3	On Test Selector: a. Operate **FWD SUPV OFF HK** and **REV SUPV OFF HK.** b. Operate **LINE** or **DROP** to split to desired direction.
4	On Communications Panel: a. Operate **HEADSET TEST CKT.** b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. c. Press **DIALER TEST CKT.** Also press **STOP DIAL** to disable stop-dial function (lamp goes out). d. Press **MF** or **DTMF**, depending on the circuit. e. Dial desired trunk number on keypad. For automatic out-dialing, refer to Table 3-3.

9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

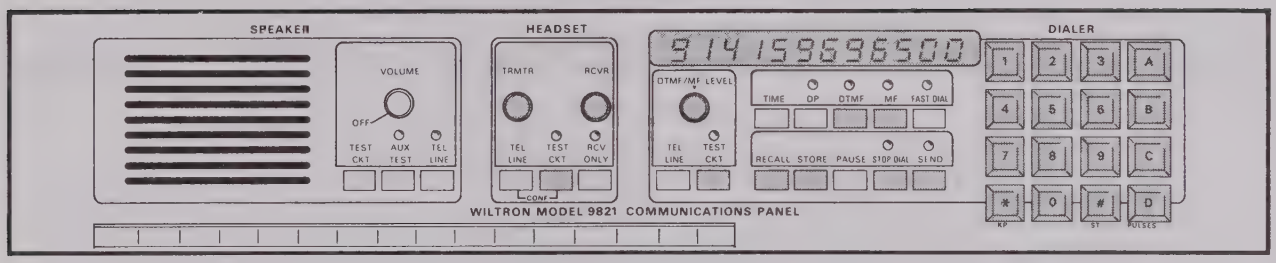


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

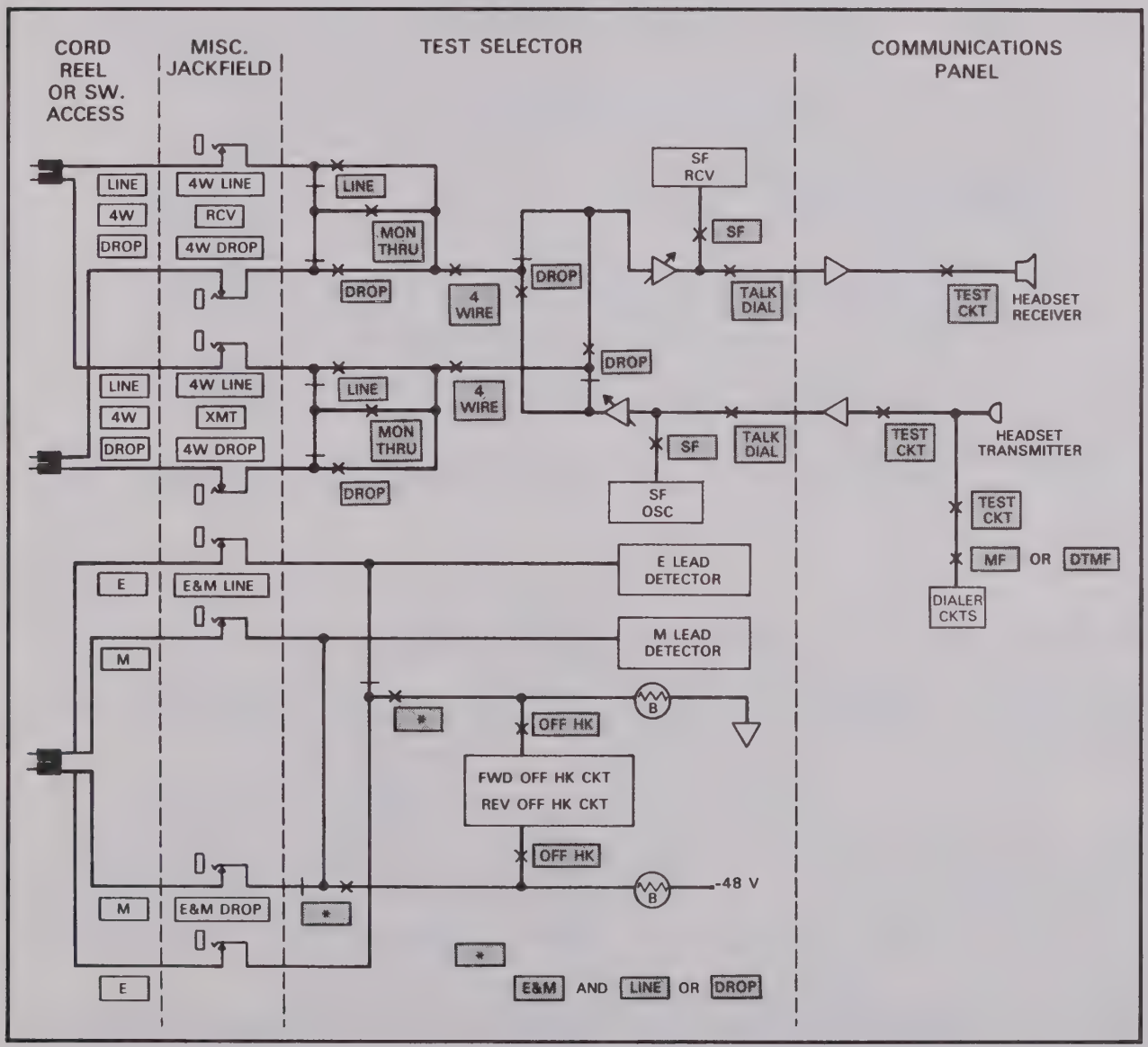
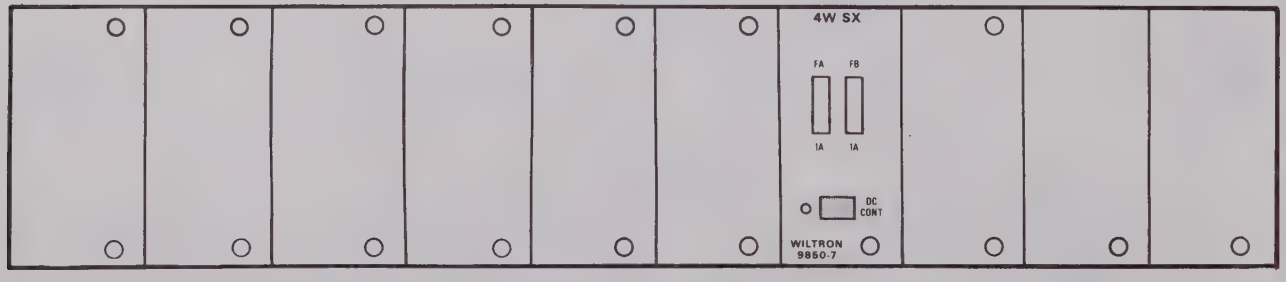


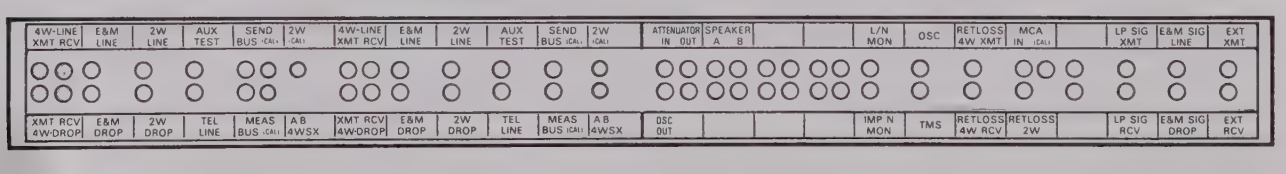
Table 3-19. Four-Wire SX Talk/Dial, Split to Line or Drop

STEP	PROCEDURE
	NOTE For testing SX talk/dial on stop-dial, wink-start, or delay-dialing trunks, do not use this procedure; go to Table 3-21.
1	On Test Selector Panel: a. Operate **MON THRU** and **4 WIRE.** b. Simultaneously operate **SX** and **LOOP** for loop closure or **SX** and **B&G** for B&G. c. Operate **TALK DIAL.**
2	On 9850-7 4W SX Unit, to maintain loop current after the circuit is split, operate **DC CONT.**
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, check that circuit under test is idle.
4	On Test Selector Panel, operate **LINE** or **DROP** to split to the desired direction.
5	On Communications Panel: a. Operate **HEADSET TEST CKT.** NOTE If **SPEAKER TEST CKT** and **HEADSET TEST CKT** are simultaneously operated and the **VOLUME** is not set to **OFF**, the headset transmitter is disabled. To indicate that it is disabled, the **RCV ONLY** LED lights. b. Adjust **TRMTR** and **RCVR** for desired transmitting and receiving levels. c. Press **DIALER TEST CKT** and **DP.** For fast dialing, also press **FAST DIAL** button; **FAST DIAL** lamp is lit. d. Press **STOP DIAL** to disable stop-dial function (lamp goes out). e. Dial desired number on keypad. For automatic dialing, refer to Table 3-3.

9850-7 4W SX OPTION

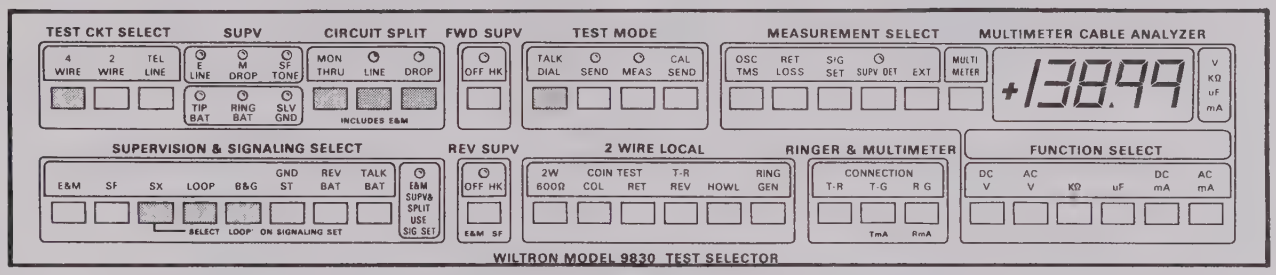


9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL

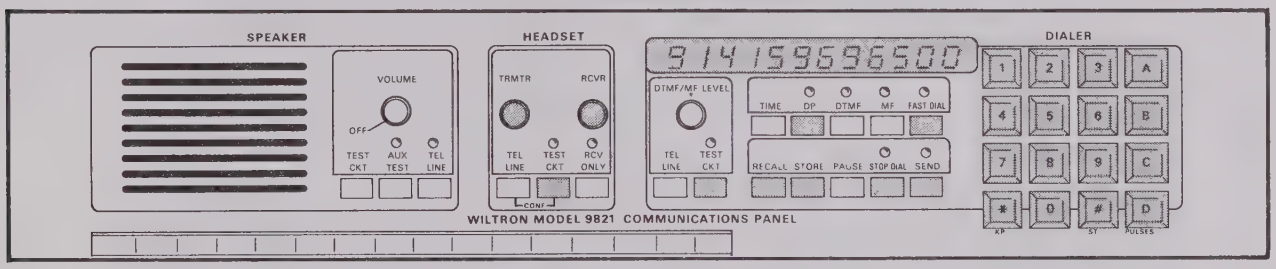


9860-MT CORD REEL PANEL (IF INSTALLED)

9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

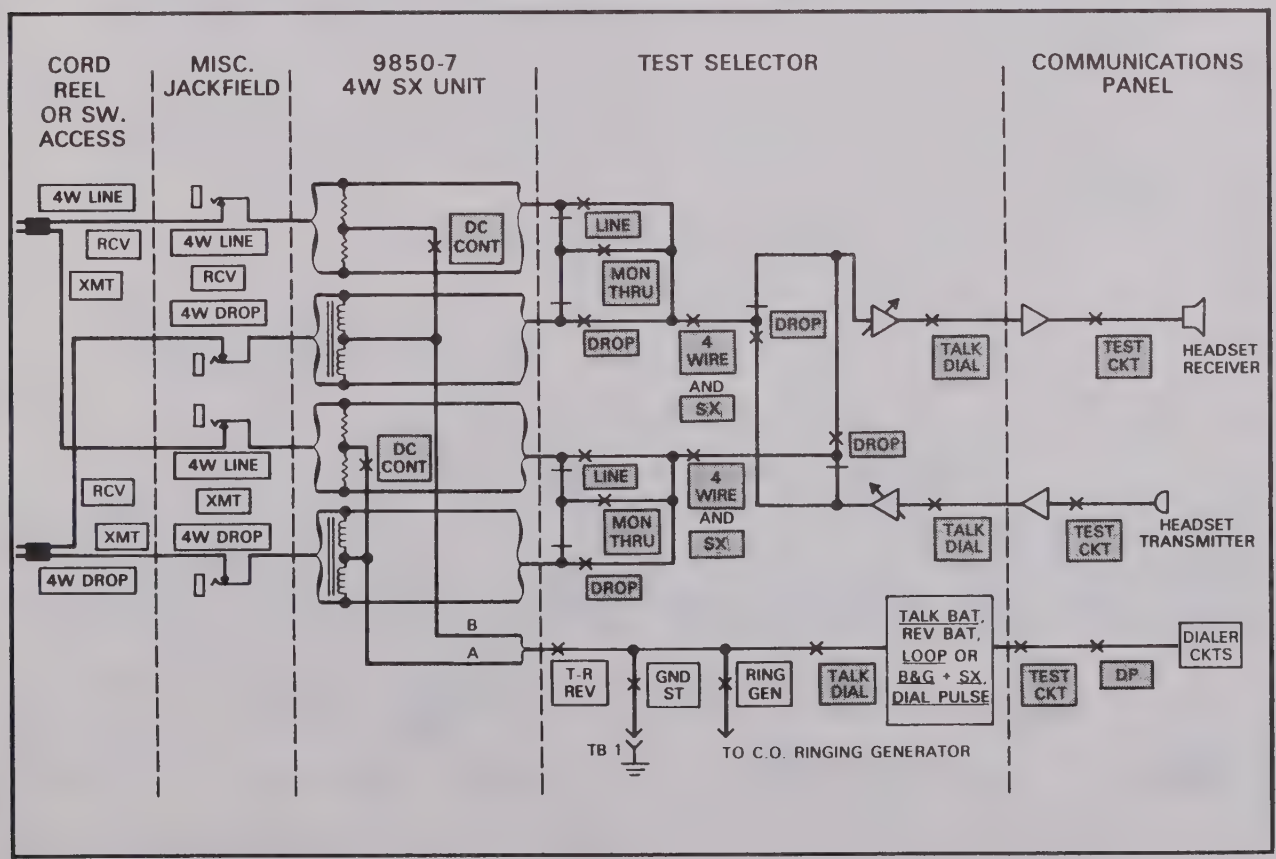
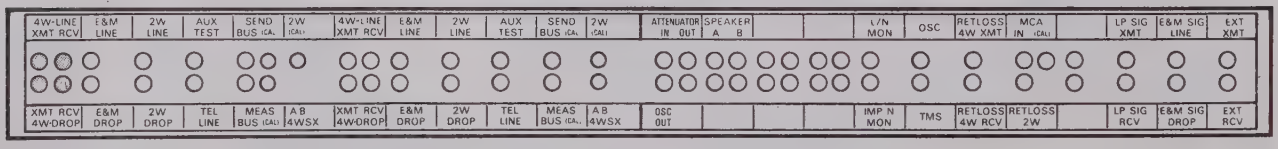


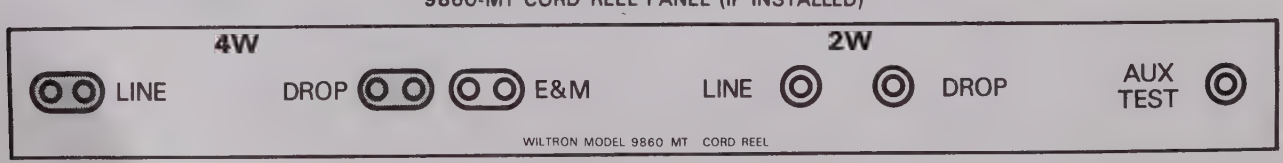
Table 3-20. Four-Wire Return Loss Measurements

STEP	PROCEDURE
	NOTE If an external return loss test set is used, connect its transmitter output to the **RET LOSS 4W XMT** jack on the 9865 jackfield and its receiver input to the **RET LOSS 4W RCV** jack on the 9865 jackfield.
1	On Test Selector Panel: a. Operate **MON THRU.** b. Operate **4 WIRE.** c. Operate **RET LOSS.** d. Operate **MEAS.**
2	On 9310 Return Loss Control Panel, set **TEST LEVEL POINT** to 0 when splitting to the drop; return loss transmitter level is -2 dBm. Or, if split to the line, set **TEST LEVEL POINT** to -16/+7 when splitting to the line; return loss transmitter level is -25 dBm.
3	Simultaneously access line and drop of circuit under test to cord reel, jackfield, or switched access. Before proceeding, listen to check that circuit under test is idle.
4	Operate **LINE** or **DROP** to split to the desired direction.
5	Locate the 4-wire termination set (hybrid) at the far end.
6	Connect a short to the 2-wire side of the hybrid.
7	On return loss display, note trans-hybrid loss reading of the hybrid.
8	On 9310 Return Loss Control Panel, set **THL CORRECTION** to the return loss reading of the hybrid.
9	Remove the short from the hybrid.
10	On Communications Panel, press **MF** or **DTMF**, as required by the circuit. Dial the code on the keypad for a balance termination. For automatic out-dialing, see Table 3-3.
11	On 9310 Return Loss Control Panel: a. Operate **ERL.** Note echo return loss reading on display. b. Operate **SRL-LO.** Note reading on display. c. Operate **SRL-HI.** Note reading on display. d. Compare the readings in steps b and c; the lower reading is the singing point of the circuit.

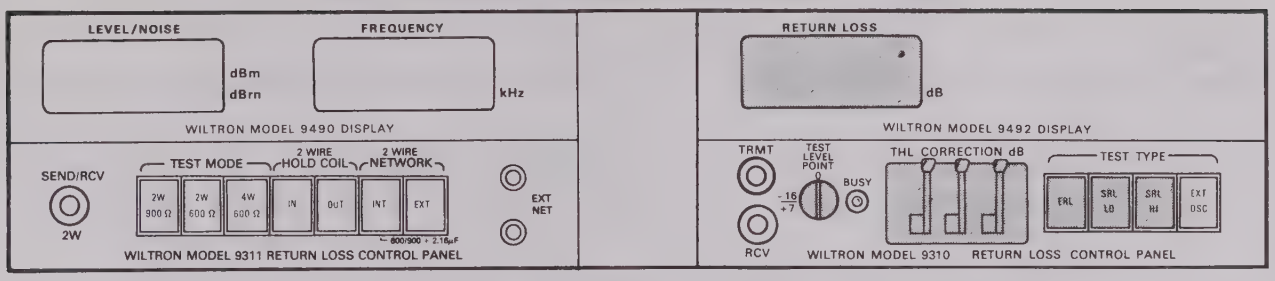
9865-MT MISCELLANEOUS JACKFIELD AND DISTRIBUTION PANEL



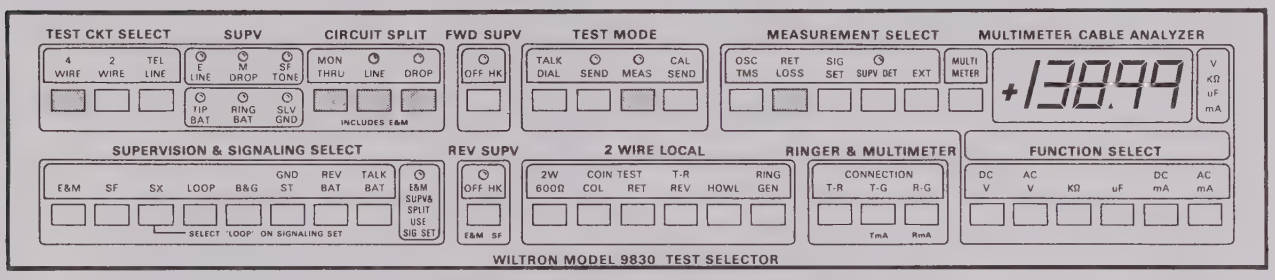
9860-MT CORD REEL PANEL (IF INSTALLED)



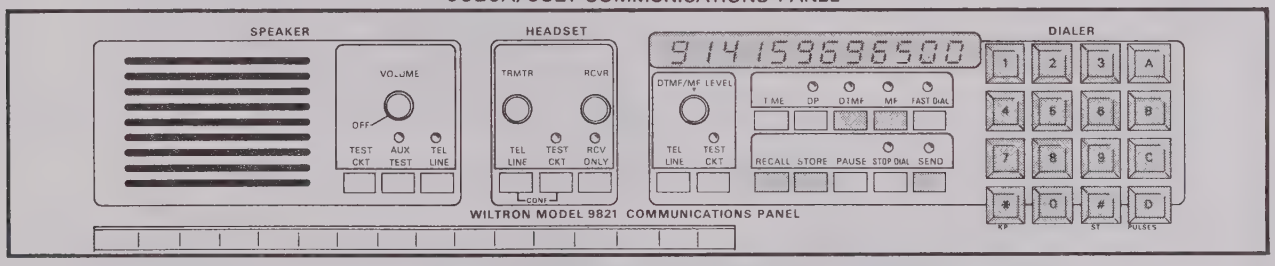
9102A-TB DEDICATED TRANSMISSION MEASUREMENT SYSTEM



9830 TEST SELECTOR PANEL



9820A/9821 COMMUNICATIONS PANEL



SIMPLIFIED BLOCK DIAGRAM

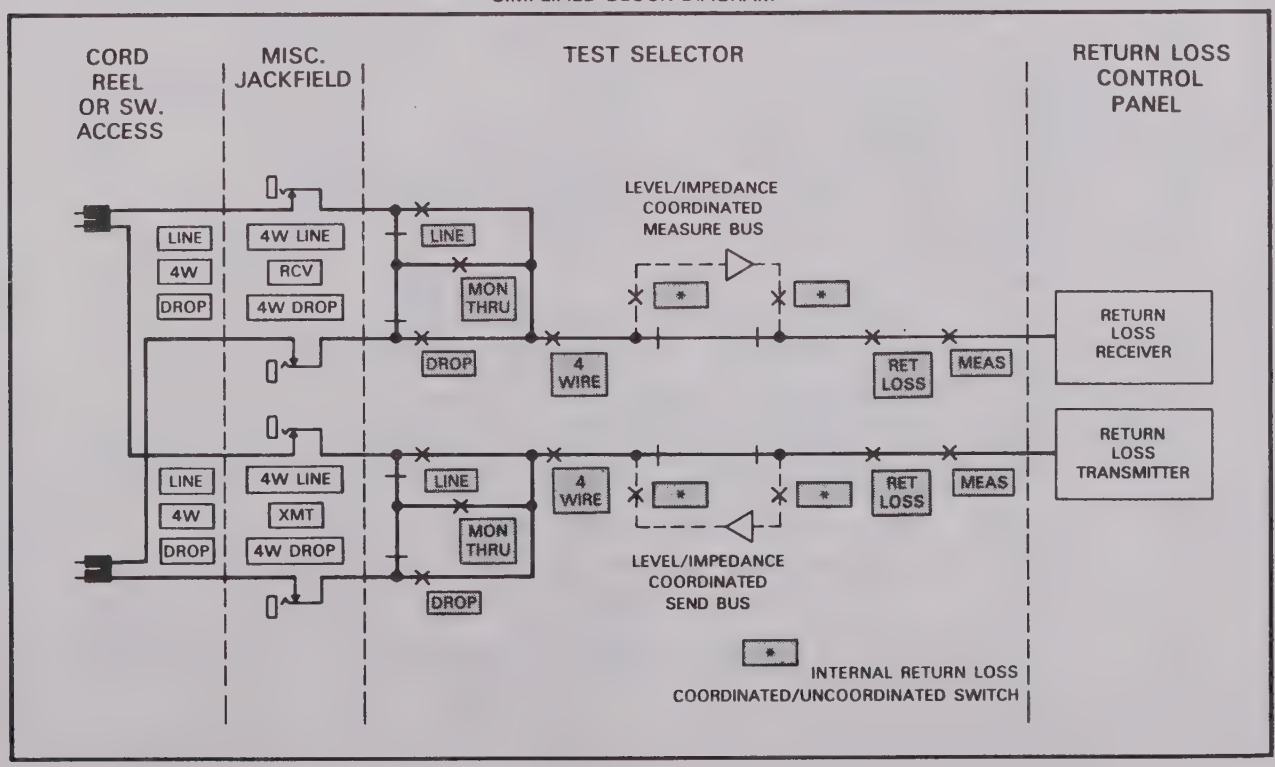
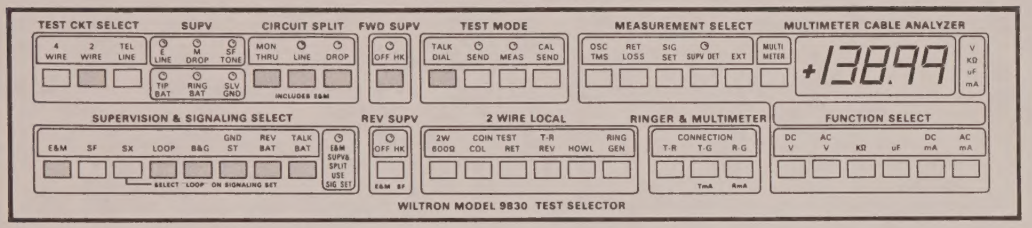


Table 3-21. Stop-Dial, Wink-Start, and Delay Dialing

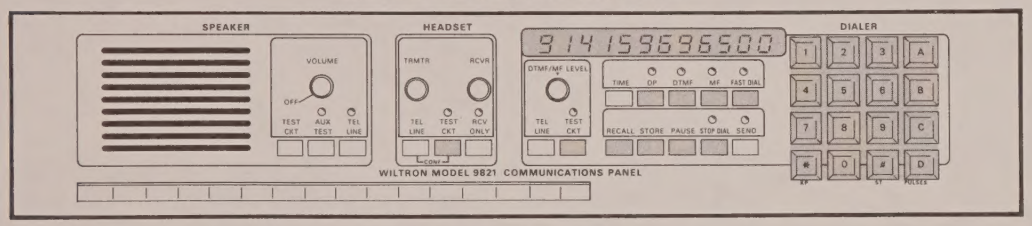
STEP	PROCEDURE
1	On 9820A or 9821: a. Press **DIALER TEST CKT** and operate **HEADSET TEST CKT.** b. Press **STOP DIAL** to activate stop-dial or wink-start function (**STOP DIAL** lamp is lit). c. For stop-go trunks, press **DP** button. For wink-start or delay-dial trunks, press **DP, DTMF,** or **MF.** d. For fast dialing, press **FAST DIAL** button (lamp lit). e. Dial trunk number into storage, as follows: (1) Press **STORE,** and dial trunk-number digits on keypad. Example: 0123456 (DP) or *0123456# (MF) (2) For trunks with ANI, change dial mode to **MF,** and dial calling-party digits. Example: 0123456 . * 78901234# **ST** button on keypad ANI digits (MF) **KP** button on keypad mode change or dial pause (9821) trunk number (DP) NOTE For MF trunks, press **PAUSE** button on 9820A or 9821 after dialing trunk number. f. On 9821, if number is in a repertory register, momentarily press **RECALL** and associated keypad buttons to recall number (see Table 3-2, step 5 for buttons and corresponding registers).
2	Access line and drop of circuit to cord reel, jackfield, or switched access. A typical stop-dial test setup is shown on page 3-41.
3	On 9830 Test Selector: a. Operate **2 WIRE** or **4 WIRE,** and operate **MON THRU.** b. Operate desired **SUPERVISION & SIGNALING SELECT** switches. c. Operate **LINE** or **DROP** to split circuit. d. Operate **TALK DIAL.** e. For 2-wire circuits, operate **FWD SUPV OFF HK.** For 4-wire circuits, operate **FWD** and **REV SUPV OFF HK.** (Do not operate them for 4W SX, however.)
4	On 9820A or 9821, observe the following during out-dialing: a. **SEND** lamp flashes as digits are sent out, and stays lit when out-dialing is interrupted by stop-dial signal (far end off-hook), by dial-mode change, or pause. On 9821, flashing digit indicates interruption. b. When far end goes on-hook, out-dialing resumes. c. When out-dialing ends, **SEND** lamp goes out, and 9821 displays first 12 digits. NOTE If on-hook is not received by 9820A or 9821, press **SEND** button to force remaining digits out of dialer.
5	Perform desired tests.

2–WIRE TEST CONFIGURATION

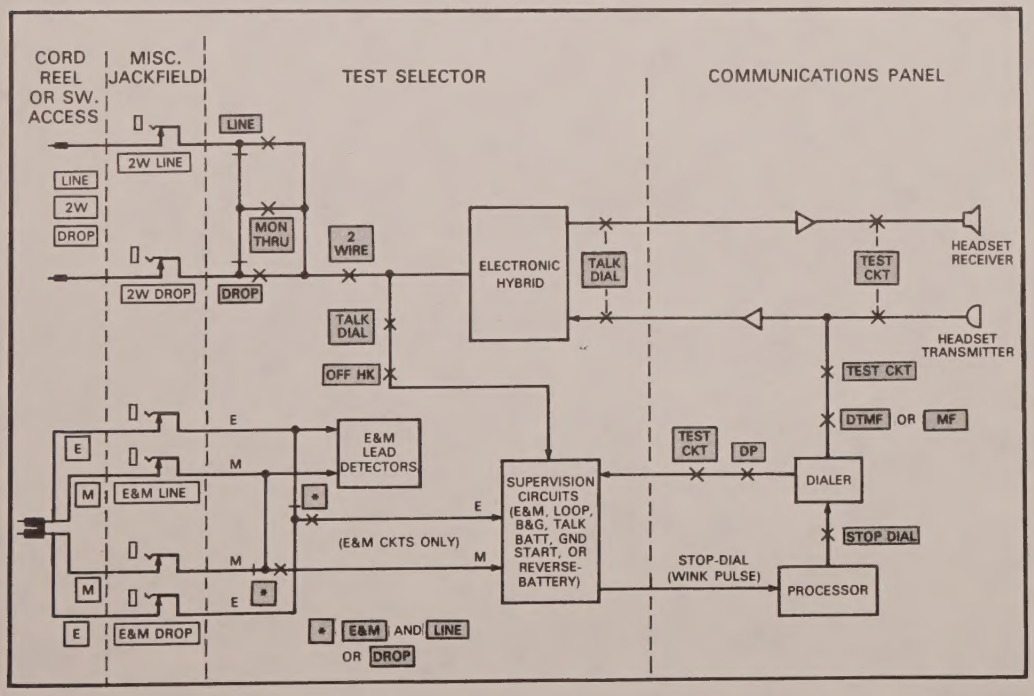
9830 TEST SELECTOR PANEL



9820A OR 9821 COMMUNICATIONS PANEL

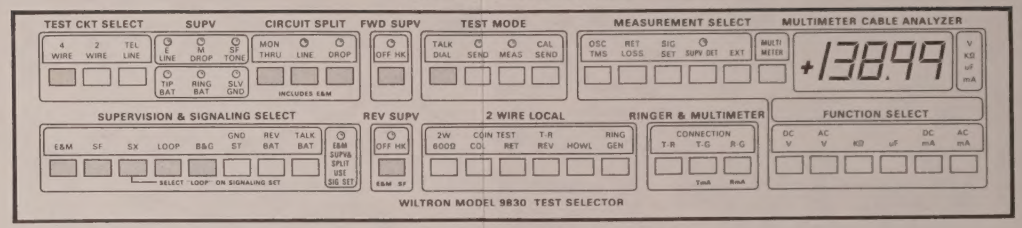


SIMPLIFIED BLOCK DIAGRAM

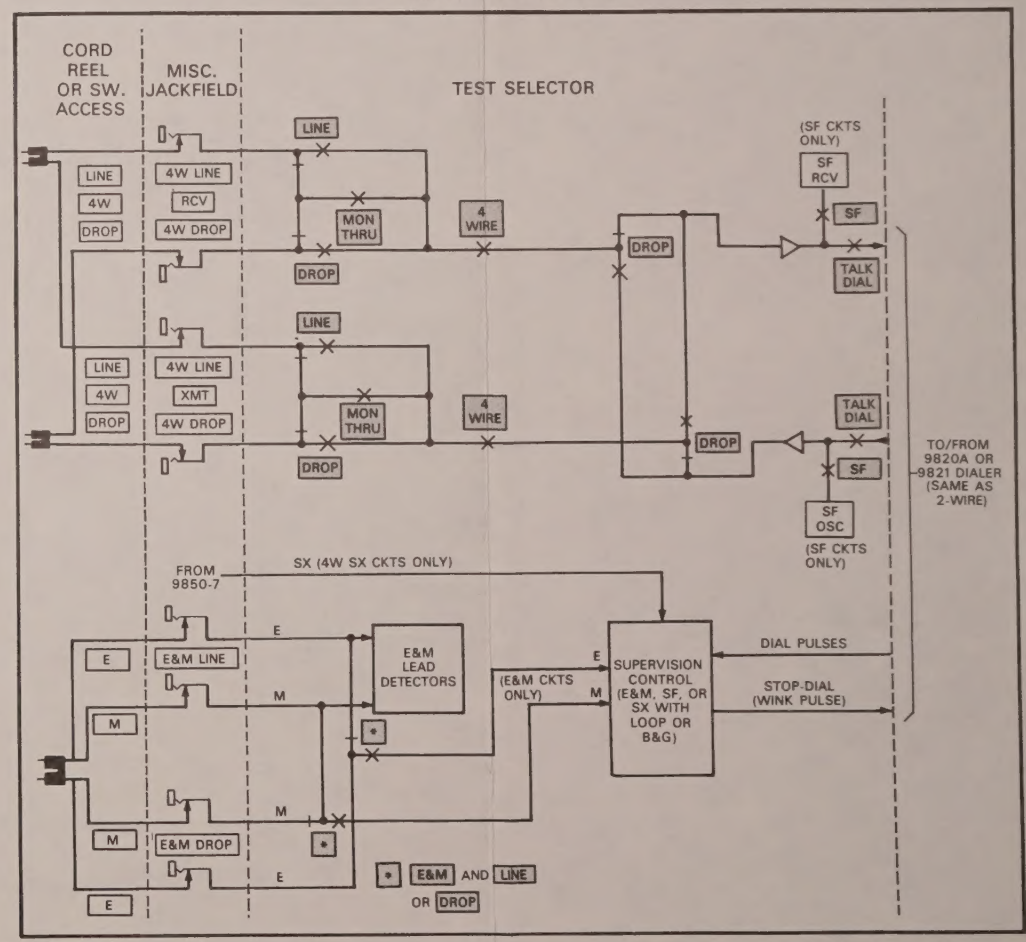


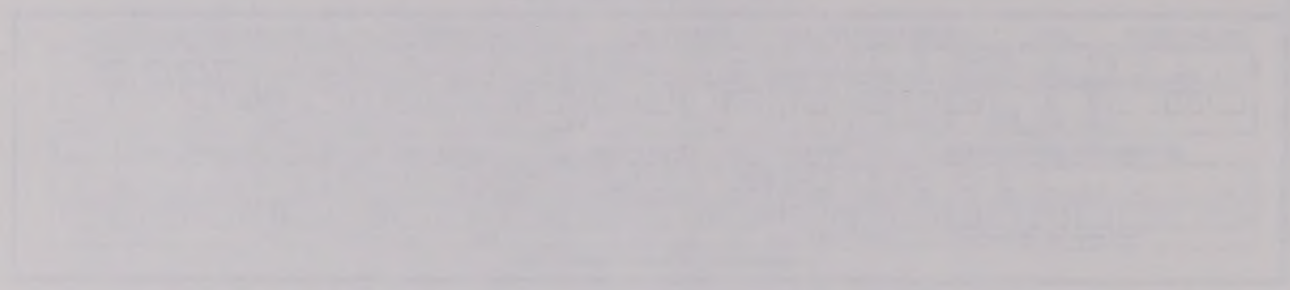
4–WIRE TEST CONFIGURATION

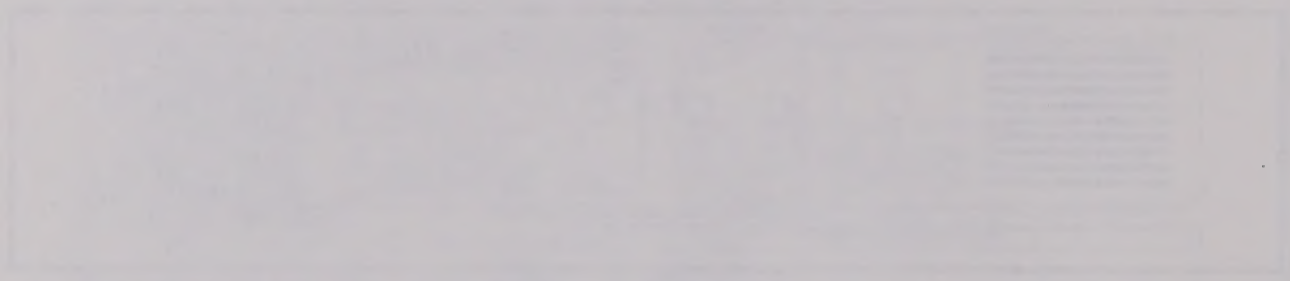
9830 TEST SELECTOR PANEL



SIMPLIFIED BLOCK DIAGRAM







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Issued By: Jim Steinau	Issue Date: 10/19/93

CHANGE NOTICE SUMMARY

Revision	Reason for Change	Date of Change